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ABSTRACT

Non-commercial investigator-developed tests and other instruments to assess mathematical instruction, reported in journals, dissertations, and ERIC documents from 1974 through mid-1981, are listed. For approximately 90 instruments, information on content, format, sample, reliability, correlations, and validity is included, as well as references. Other instruments for which only partial information was available are also cited on a supplementary list, followed by a list of references for this supplement. An index lists instruments by cognitive topic or as affective assessment or teaching analysis tools. An index of authors and educational levels concludes the document. (No instruments included.) (MP)

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MATHEMATICS EDUCATION REPORTS

UNPUBLISHED INSTRUMENTS
FOR EVALUATION IN MATHEMATICS EDUCATION:
AN ANNOTATED LISTING, 1974-1981

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Unpublished Instruments
for Evaluation in Mathematics Education:
An Annotated Listing, 1974-1981

Researchers frequently meet a problem in their design of a study at the point at which they must evaluate the results of the treatments. Teachers frequently have the same need as they attempt to evaluate a particular aspect of their instructional program. There are three alternatives: (1) use a standardized instrument, (2) use an instrument someone else has developed for another research study, or (3) develop an instrument specific to the dimensions of the study.

There are times when the first alternative is the most appropriate; e.g., when the scope of content in the treatment is broad or there is a need to determine impact with a normed instrument. There are times when the second alternative is logical; e.g., when the two studies are focused on attainment of the same objectives. Many times the third alternative is the most appropriate, for the objectives are specific to the study and not to any other study.

There are many comments in the literature of mathematics education about the need for careful selection of appropriate instruments. One difficulty is inherent in opting for the second alternative: there is a paucity of information on instruments that have been developed by other researchers. The search for an instrument which already might exist often takes longer than the process of developing a new instrument.

This document is the second volume designed to aid in resolving this difficulty. The first volume compiled instruments from 1964 through 1973[1];

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[1] Suydam, Marilyn N. Unpublished Instruments for Evaluation in Mathematics Education: An Annotated Listing. Columbus, Ohio: ERIC Clearinghouse for Science, Mathematics and Environmental Education, January 1974. ERIC: ED 086 518.

this update includes instruments from 1974 through mid-1981. Presented are summaries of instruments which have been noted in research reports in mathematics education. The listing is intended as a reference: no endorsement of any kind should be implied. Each researcher must ascertain whether an instrument is appropriate for a particular study. The instruments (or at least sample items) are (hopefully) available in the references cited: neither the author nor ERIC/SMEAC has a collection of these instruments.[2] The primary purpose of this document is to increase awareness of what instruments exist. It may also lead to identification of areas in which few or no instruments exist, and thus stimulate interest in developing instruments in these areas.

Scope

The scope of this compilation is subject to many limitations; some pertinent factors to consider include:

(1) The sources for the instruments are dissertation abstracts included in Dissertation Abstracts International, journal articles which had previously been categorized as pertaining to test construction, and ERIC documents.

(2) In the source, there was a statement or clear implication that the instrument was developed by the investigator. Unless this statement or implication was found, the instrument was not listed; thus, other investigator-developed instruments probably exist. In a few instances, instruments were developed by someone

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[2] "Order No." in references for dissertations pertains to the number to be used in ordering a copy of the dissertation from University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106. ERIC documents may be ordered from the Educational Document Reproduction Service, Box 190, Arlington, Virginia 22210.

other than the investigator; they are included because of their potential for use.

(3) The presumption has been made that a researcher who cites an investigator-developed instrument in a dissertation abstract has included that instrument in the dissertation. This may not be true; all dissertations were not checked.

(4) The time period for which sources were checked is from 1974 through mid-1981. This continues from the point at which the first collection stopped.

(5) The instruments were used with a sample of students from kindergarten through grade 12, with preservice or in-service teachers at the elementary or secondary school level, or with college students.

(6) No claim is made for comprehensiveness: omissions may have occurred through error or oversight.

(7) These instruments are all related to mathematics education, primarily by content. Non-mathematics-related instruments used in a mathematics study were not included.

Sequence

The document consists of two parts, an annotated listing of instruments and a supplementary list of instruments.

(1) The annotated listing of instruments is presented in alphabetical order by the instrument-developer's last name. The annotation includes:

(a) Title of the instrument. Quotation marks around a title indicate that a test name was not given in the reference, so the title was assigned.

(b) Developer of the instrument.

(c) Content: what the instrument is designed to measure.

(d) Format: the number and type of items and other pertinent information (when specified in the reference).

(e) Sample: the number and the grade or age level of the students used for determining the reliability of the instrument or participating in the study.

(f) Reliability: the statement about or the data pertaining to the reliability of the instrument, with the statistical procedure identified when specified in the reference.

(g) Correlations: coefficient for or statements about correlations with other instruments.

(h) Validity: statements from the reference that seemed pertinent to the validity of the instrument.

(i) References: a source or alternative sources of information about the instrument.

(2) The supplementary list of instruments notes instruments for which the reference included little information about development or data on the instrument's reliability and/or validity.

A list of references for this second part is included. No list of references is given for the first part: the reference is included with each instrument cited, so a separate list seemed redundant.

There are two indexes. In the first index, the instruments are categorized by type (cognitive, affective, and teaching analysis) and by mathematical topic. The level of the sample is noted ("E" denotes elementary; "S", secondary; "C", college; "TE", teacher education). The second index is a list of instrument developers, given alphabetically by level. Both indexes refer to the annotated listing.

Title: "Test of Intellectual Developmental Levels"

Developed by: H. Adi

Content: cumulative developmental levels (early concrete operations, late concrete operations, early formal operations), constructed around the schema of keeping an equilibrium in balance

Format: 15-item, paper-and-pencil, multiple-choice test, with diagrammatic presentations

Sample: 75 undergraduate elementary education majors

Reliability: not specified in abstract

Correlations: not specified in abstract

Validity: "Validity of the cumulative scale was established by a Guttman scaling analysis", yielding a coefficient of reproducibility of .96.

Reference: Adi, Helen. The Interaction Between the Intellectual Developmental Levels of College Students and Their Performance on Equation Solving When Different Reversible Processes Are Applied. (The Florida State University, 1976.) Dissertation Abstracts International 38A: 1950-1951; October 1977. (Order No. 77-22,098)

Title: "Attitude Toward Mathematics Scale"

Developed by: L. R. Aiken

Content: attitude toward mathematics

Format: Enjoyment of mathematics (E scale), 11 items; value of mathematics (V scale), 10 items. Items randomly arranged in a Likert-type format with 17 other items concerned with interests, achievement, and other biographical information.

Sample: 185 college freshmen (Nolen: 96 elementary teachers)

Reliability: For E scale, r = .95 (coefficient alpha); internal consistency correlations for individual items, .75 to .95. For V scale, r = .85 (coefficient alpha); internal consistency correlations for individual items, .60 to .81.

Correlations: For E scale, r = .38 with Scholastic Aptitude Test - Mathematics (SAT-M); r = .10 with Scholastic Aptitude Test - Verbal (SAT-V); r = .23 with rank in high school class. For V scale, r = .27 with SAT-M; r = .35 with SAT-V; r = .40 with rank in high school class.

These findings "attest to the discriminant validity of the scales."

Validity: Correlations between the two scales was .64, "indicating that although there was considerable overlap between the two scales, they were not measuring identical variables." (Nolen: 3 factors)

Reference: Aiken, Lewis R. Two Scales of Attitude Toward Mathematics. Journal for Research in Mathematics Education 5: 67-71; March 1974.

Nolen, William F. et al. Explorations in Mathematics Attitude: An Empirical Investigation of the Aiken Scale. 1976. ERIC: ED 133 349.

Title: "Probability and Statistics Test"

Developed by: J. D. Austin

Content: discrete probability and statistics

Format: 40 items stratified by four cognitive levels

Sample: 71 college sophomores

Reliability: r = .59 to .92 (Nunnally)

Correlations: not specified in article

Validity: Items were based on lesson behavioral objectives.

Reference: Austin, Joe Dan. An Experimental Study of the Effects of Three Instructional Methods in Basic Probability and Statistics. *Journal for Research in Mathematics Education* 5: 146-154; May 1974.

Title: "Measures of Content-Methods Course Achievement"

Developed by: G. A. Badmus

Content: mathematics topics

Format: five criterion-referenced measures

Sample: 63 preservice elementary teachers

Reliability: r = .79 to .94

Correlations: not specified in abstract

Validity: "The method of construction of the measures insured their content validity."

Reference: Badmus, Ganiyu Ademola. A Formative Evaluation of the Mathematics Education Component of the Eighth Cycle Teacher Corps Program at Michigan State University. (Michigan State University, 1974.) Dissertation Abstract International 36A: 227; July 1975. (Order No. 75-14,325)

Title: Creative Ability in Mathematics Test

Developed by: D. S. Balka

Content: creative ability in mathematics

Format: 6 paper-and-pencil items

Sample: 500 students in grades 6, 7, and 8

Reliability: not specified in abstract

Correlations: Positive relationships were found between creative ability in mathematics and achievement, intelligence, and general creativity, but the creative abilities measured by the CAMT are not the same abilities as those measured by the other tests.

Validity: Criteria from various general creativity tests were collected, rewritten in mathematical terminology, and sample problems generated for each criterion. The survey was submitted to samples of mathematicians, mathematics educators, and secondary school mathematics teachers. Based on their responses indicating which were most important, six criteria were selected and a pool of items was generated for each, validated for appropriateness and understanding by a panel of judges, and pilot-tested to determine the best item from each of the six sets. From part-whole correlation coefficients, six items were chosen to constitute the instrument. Construct validity was assessed and two factors determined. (See also "Correlations".)

Reference: Balka, Don Stephen. The Development of an Instrument to Measure Creative Ability in Mathematics. (University of Missouri-Columbia, 1974.) Dissertation Abstracts International 36A: 98-99; July 1975. (Order No. 75-15,965)

Title: "*Understanding of Addition*"

Developed by: E. H. Barco

Content: addition with one-, two-, and three-digit numbers

Format: paper-and-pencil plus individual interview

Sample: 30 pupils in grade 3

Reliability: r = .95 for paper-and-pencil portion (Spearman's rho formula)

Correlations: not specified in abstract

Validity: Content validity was assessed "by a panel of mathematics educators knowledgeable about elementary school mathematics. In the opinion of the panelists, the content of the test was appropriate for the purposes intended."

Reference: Barco, Ella Hamilton. Children's Understanding of Addition with One-, Two-, and Three-Digit Numbers. (The Florida State University, 1977.) *Dissertation Abstracts International* 38A: 3348; December 1977. (Order No. 77-26,972)

Title: "Attitudes of Teachers Toward Computers"

Developed by: R. J. Beauregard

Content: statements about computers

Format: five-point Likert-type scale

Sample: Preliminary 83 items distributed to 1097 teachers in grades K-12; 233 useable returns received (21%). Data rank-ordered into quartiles, with data from most-favorable and least-favorable groups subjected to item analysis. 63 statements discriminated significantly at the .01 level; 20 items with the largest F values retained to make the questionnaire manageable.

Reliability: r = .88 (split-half procedure corrected by Spearman-Brown Prophecy formula)

Correlations: not specified in abstract

Validity: Statements were derived from a literature search and were reviewed by a group of judges for suitability of syntax and appropriateness of content. The final 20 items were subjected to inter-item and inter-total correlational procedures to determine validity; "a preponderance of positive correlations was found to be significant at the .01 level." Inter-item correlation coefficients ranged from .02 to .64 (average, .58).

Reference: Beauregard, Raymond John. Construction and Validation of a Scale to Measure the Attitudes of Teachers Toward Computers. (West Virginia University, 1975.) Dissertation Abstracts International 36A: 7060-7061; May 1976. (Order No. 76-11,745)

Title: *Beckmann-Beal Mathematical Competencies Test for Enlightened Citizens*

Developed by: M. W. Beckmann and J. L. Beal; C. F. Cramer

Content: 48 mathematical competencies

Format: 96 multiple-choice items

Sample: 1430 students in grade 12 in 232 Nebraska schools

Reliability: r = .95

Correlations: not specified in abstract

Validity: The 48 competencies were described by a committee of the National Council of Teachers of Mathematics. A jury of mathematics education experts served to judge the validity of the test items.

Reference: Cramer, Carl Fredrick. A Study of Achievement Levels of Nebraska High School Seniors on a Test Designed to Measure Mathematical Competencies. (The University of Nebraska-Lincoln, 1974.) *Dissertation Abstracts International* 35A: 5955-5956; March 1975. (Order No. 75-3414)

Title: "Cognitive Preference Scales"

Developed by: M. J. Behr and P. M. Eastman

Content: to assess deductive-inductive preference and figural-symbolic preference

Format: two scales with equivalent items on each scale in each mode

Sample: After pilot testing, the scale was administered to 92 students in a mathematics course for elementary teachers, 38 students in an elementary mathematics methods course, and 40 in-service elementary teachers.

Reliability: r = .85 to .91 (Kuder-Richardson Formula 20)

Correlations: not specified in article

Validity: assessed by examining reliability coefficients and deviation from normality of score distribution

References: Behr, Merlyn J. and Eastman, Phillip M. Development and Validation of Two Cognitive Preference Scales. Technical Report No. 5. Austin: University of Texas Mathematics Education Center, 1975. ERIC: ED 106 123.

Behr, Merlyn J. and Eastman, Phillip M. Development and Validation of Two Cognitive Preference Scales. *Journal of Experimental Education* 46: 28-34; Spring 1978.

Title: "Non-computational Statistics Test"

Developed by: E. M. Bienstock

Content: non-computational questions on statistics

Format: 30 multiple-choice items

Sample: 173 college students

Reliability: r = .80 to .85 (Kuder-Richardson Formula 20)

Correlations: not specified in abstract

Validity: covered only material taught in first half of semester

Reference: Bienstock, Eric M. Initial Level of Learning, Retention, New Learning, and Self-Relearning of Basic Statistics. (New York University, 1980.) Dissertation Abstracts International 41A: 5011; June 1981. (Order No. 8110699)

Title: Volume Units of the Metric System

Developed by: T. E. Bilbo

Content: metric units of volume

Format: 20 items on estimation, 20 items on computation, and 12 items related to measuring

Sample: classes of college students

Reliability: r = .90

Correlations: not specified in abstract

Validity: Test was sent to selected metric authorities for evaluations; items not approved by a majority of the judges were deleted.

Reference: Bilbo, Thomas Earl. A Comparison of Two Different Approaches for Teaching Volume Units of the Metric System. (University of Southern Mississippi, 1976.) Dissertation Abstracts International 37A: 2091-2092; October 1976. (Order No. 76-22,994)

Title: "Diagnostic Assessment Instrument"

Developed by: V. J. Bosland

Content: addition

Format: 2 forms (A and B)

Sample: Form A was given one week before Form B to 26 pupils in grades 3 and 4. Form A was administered with a three-week interval between pre- and posttesting, also in grades 3 and 4.

Reliability: r = .91 (grade 3), .49 (grade 4). Test-reliability, Form A, r = .83 (grade 3), .57 (grade 4)

Correlations: not specified in abstract

Validity: not specified in abstract

Reference: Bosland, Viva Jean. Diagnostic Assessment of Addition Processes with Identification and Remediation of Error Patterns. (George Peabody College for Teachers, 1977.) Dissertation Abstracts International 38A: 4636-4637; February 1978. (Order No. 7731611)

Title: "Statistics Test"

Developed by: A. U. Boveda

Content: introductory statistics concepts

Format: An initial pool of 200 items was constructed and pilot-tested to determine difficulty and validity indices. Equivalent forms A and B, each comprised of 75 four-choice items, were then formed and rechecked for reliability and validity.

Sample: 225 graduate students and 30 undergraduate students (phase 1); 280 graduate students and 90 undergraduate students (phase 2)

Reliability: Form A, r = .89; Form B, r = .90; combined forms, r = .96 (Kuder-Richardson Formula 20)

r = .95 (equivalent forms)

Correlations: not specified in abstract

Validity: Five textbooks commonly used in introductory statistics courses and a representative cross-section of journals were examined to identify statistical terms. Four judges rated the terms for importance.

Reference: Boveda, Amparo U. Diagnosis of Deficiencies in the Understanding of Concepts of Statistics. (The Catholic University of America, 1975.) Dissertation Abstracts International 37A: 188-189; July 1976. (Order No. 76-14,724)

Title: "Attitude Toward Mathematics Scales"

Developed by: J. M. Bowling

Content: attitudes toward mathematics

Format: 48-item, Likert-type, multidimensional scale with three subscales (Nature, 9 items; Enjoyment, 10 items; Value, 7 items); some items were drawn from existing scales.

Sample: First version piloted with one class in probability and statistics; revised. Second version administered to four undergraduate mathematics classes (n = 126), including one comprised of preservice teachers; revised. Third version (33 items) administered to pre- and in-service teachers at the beginning (n = 382) and conclusion (n = 299) of a mathematics course and a methods course, and by a sample of traditional (n = 21) and informal (n = 8) elementary teachers.

Reliability: Generally, r = .90 - .95 for E scale; r = .70 - .85 for V and N scales (coefficient alpha). Scale intercorrelations generally .60 - .70 for E-N, .50 - .60 for V-N, .45 - .55 for E-V.

Correlations: No significant relationship was found between the N scale total and an application-level final examination score for a subsample of the content course in mathematics (n = 92).

Validity: Univariate analyses of variance with E, V, and N as criterion variables were supportive of scale separation. "Limitations of the study were most severe for internal validity."

Reference: Bowling, John Michael. Three Scales of Attitude Toward Mathematics. (The Ohio State University, 1976.) Dissertation Abstracts International 37A: 4927-4928; February 1977. (Order No. 77-2354)

Title: "Mathematics Placement Test"

Developed by: S. Brooks and M. Hartz

Content: number systems, geometry, and algebra

Format: 75-item branching test, grouped into 5-item blocks by difficulty and balanced content

Sample: initial 300 items on 24 equivalent tests administered to 341 students in grades 11 and 12; final 75 items administered to 267 community college freshmen

Reliability: r = .93 (Kuder-Richardson Formula 20), 1978; r = .70, 1979

Correlations: not specified in article

Validity: To insure content validity, 300 items were written by 11 college mathematics instructors.

References: Brooks, Sarah and Hartz, Mary A. Predictive Ability of a Branching Test. Educational and Psychological Measurement 38: 415-419; Summer 1978.

Brooks, Sarah and Hartz, Mary. Student Placement -- a Comparison of Traditional and Computerized Branching Test Administrations. Journal for Research in Mathematics Education 10: 213-216; May 1979.

Title: "Formal Reasoning Instrument"

Developed by: G. M. Burney

Content: items to assess formal reasoning (Piaget's formal stage of development): syllogisms, verbal analogies, questions involving combinatorial and probabilistic reasoning, and questions similar to Piagetian tasks

Format: 24-item, group-administered, paper-and-pencil objective instrument

Sample: 42 items constructed after a review of the literature. Administered to 50 students in grades 9, 11, and 13, followed by use of five Piagetian-type tasks. Following validity analysis, 24 items selected, administered to 78 students in grades 9, 11, and 13, followed by use of the five Piagetian-type tasks.

Reliability: r = .83 (Kuder-Richardson formula 20)

Correlations: not specified in abstract

Validity: Biserial r correlation coefficients were computed for each item using scores on the tasks as an outside criterion to give a value of item validity for each paper-and-pencil item, and a measure of internal consistency. To determine concurrent validity, the Pearson product-moment correlation coefficient was also calculated comparing scores on the objective test with scores on the tasks; r = .85.

When students were classified as formal or non-formal on the instrument and tasks, an 88.5% agreement in classification was achieved, with an 84.6% agreement when students were classified into three categories (formal, transitional, and concrete or below).

It was concluded that a valid instrument can be constructed, using verbal analogies and certain paper-and-pencil tasks (omitting syllogisms).

Reference: Burney, Gilbert McCollum. The Construction and Validation of an Objective Formal Reasoning Instrument. (University of Northern Colorado, 1974). Dissertation Abstracts International 35B: 4535-4536; March 1975. (Order No. 75-5403)

Title: "Achievement Test"

Developed by: W. G. Cathcart

Content: geometry; numeration; basic facts of addition, subtraction, multiplication, and division

Format: 7 scores

Sample: 60 students in grade 2 and 60 students in grade 3 randomly selected from 12 schools in or near Edmonton, Alberta

Reliability: r = .89 (Kuder-Richardson Formula 20)

Correlations: not specified in article

Validity: based on the content of the "Seeing Through Arithmetic" texts (Scott, Foresman) for grades 1 and 2 and covered in the school program

Reference: Cathcart, W. George. The Correlation of Selected Nonmathematical Measures with Mathematics Achievement. Journal for Research in Mathematics Education 5: 47-56; January 1974.

Title: "Piagetian Battery"

Developed by: C. S. Cookson

Content: Piagetian concepts

Format: tasks

Sample: 488 pupils in grades 4 and 5

Reliability: not specified in abstract

Correlations: Correlations between total California Achievement Test score and Piagetian score, r + .33; between Cattell Culture Fair Intelligence Test total scores and Piagetian score, r = .41 (indicating that "the Piagetian tasks measure performance distinct from intelligence and achievement").

Achievement scores most highly related to cognitive development as measured by the Piagetian battery were vocabulary (r = .38), reading total (r = .36), and mathematics total (r = .36).

Validity: not specified in abstract

Reference: Cookson, Connie Seaman. Predicting Developmental Level from Achievement and Intelligence Scores. (Auburn University, 1977.) Dissertation Abstracts International 38A: 6615; May 1978. (Order No. 7806079)

Title: "Attitude Toward School Mathematics"

Developed by: M. K. Corbitt

Content: perceived importance and liking for mathematics content topics and activities

Format: two 5-point scales, 15 items each

Sample: 50 students in two grade 8 classes

Reliability: r = .71, importance items; r = .82, liking items (Cronbach's alpha)

Correlations: No convergence was found between the 'importance' score and teacher ratings; teacher rating was negatively correlated with the written measure on 'liking'.

Validity: Importance and liking scores were correlated at .40 on the written instruments. Teachers did not discriminate between the two constructs, but the written instrument and, even more so, the interviews did.

Reference: Corbitt, Mary Kay. Validation of Two Constructs of Attitude Toward School Mathematics. (University of Georgia, 1979.) Dissertation Abstracts International 40A: 3844; January 1980. (Order No. 8000988)

Title: "Criterion-Referenced Test Items in Elementary Statistics"

Developed by: R. J. Cruise

Content: elementary statistics

Format: population pool of items

Sample: two groups of graduate students in education given a random selection of items from population pool of items

Reliability: not specified in abstract

Correlations: not specified in abstract

Validity: Content validity of the test items and of the level of mental operations assigned to each item were established by the use of expert judges.

Reference: Cruise, Robert Joe. The Development and Validation of a Population Pool of Test Items in Elementary Statistics to be Used as a Source for Criterion-Referenced Testing. (The University of Alabama, 1974.) Dissertation Abstracts International 36A: 840-841; August 1975. (Order No. 75-18,276)

Title: "Pool of Items for Preservice Elementary Mathematics Education"

Developed by: I. M. Dayoub

Content: items representative of the range of possible topics and treatments of topics which could be presented in a mathematics program for prospective elementary teachers

Format: comprehensive pool of 265 items

Sample: for preservice elementary teachers

Reliability: not specified in abstract

Correlations: not specified in abstract

Validity: Twenty persons in the fields of mathematics and mathematics education responded to the importance of each item as a unit of content for prospective elementary teachers, and to interpretations of CUPM recommendations. Forty-seven percent of the items were rated at the highest level of importance and 71% were rated at the highest level of reflection.

Reference: Dayoub, Iris Mack. An Investigation and Evaluation of Goals of Mathematics Education for Prospective Elementary Teachers (Georgia State University, 1973.) Dissertation Abstracts International 34A: 4952-4953; February 1974. (Order No. 74-2891)

Title: "Pictorial Piagetian Tasks"

Developed by: E. De Avila and S. Pulos

Content: 8 Piagetian concepts: conservation of distance, number, length, horizontality, substance, and volume; chance, perspective

Format: 40 items (5 items per concept); cartoon-like layout, with problem presented in three frames on upper portion of page and three alternative answer frames on lower portion of page

Sample: Between 1288 and 6146 students aged 6 to 11 responded to the items for each concept (pooled data).

Reliability: r = .62 to .88

Correlations: correlated with clinical method of administering tasks, r = .42 to .99

Validity: Factor analysis indicated "substantial" content validity for the pictorial tasks.

Reference: De Avila, Edward and Pulos, Steven. Group Assessment of Cognitive Level by Pictorial Piagetian Tasks. Journal of Educational Measurement 16: 167-175; Fall 1979.

Title: Mathematics Skill Test (MAST)

Developed by: R. T. Denny

Content: basic competence in 10 mathematics skills needed to succeed in high school chemistry

Format: 60-item, 45-minute power test

Sample: 105 students in grade 10 in Nashville, Tennessee; 241 students in grade 10 in Boston, Massachusetts

Reliability: r = .97, .87, .92 (Kuder-Richardson Formula 20)

Correlations: r = .80, .73 with ASC-NSTA High School Chemistry Test; correlations with chemistry grades in grade 11, r = .31, .36

Validity: not specified in report

Reference: Denny, Rita T. The Mathematics Skill Test (MAST) as Rostering and Diagnostic Tools. April 1974. ERIC: ED 089 999.

Title: Ohio Mathematics Processing Skills Test

Developed by: M. A. Disko

Content: six mathematics processing skills

Format: 42 multiple-choice items

Sample: Approximately 200 items written, reviewed by students and experts, and subsequently either rewritten or discarded. Revised items formed a pool for a pilot study and experimental field tryout by 291 students in basic mathematics courses, after which item analysis data were used to select items of appropriate difficulty and discriminatory power for the final form of the text.

Reliability: r = .87 (Kuder-Richardson)

Correlations: not specified in abstract

Validity: Skills selected for use in this study had been identified by Scandura. Selection of content was based on a study of textbooks and teachers' manuals for elementary college mathematics, and study of statements by leaders in mathematics education.

The validity of the final form was determined from discussions with a class of undergraduate mathematics students in secondary education, consultation with graduate students in mathematics, consensus of a jury of authorities in mathematics and mathematics education, and results from administration of experimental forms of the test.

Reference: Disko, Mildred Anne. Development of a Test to Measure Mathematics Processing Skills. (Ohio University, 1973.) Dissertation Abstracts International 34A: 5710-5711; March 1974. (Order No. 74-7636)

Title: *Mathematics Confidence Scale*

Developed by: D. M. Dowling

Content: confidence with respect to three types of mathematics problems (arithmetic, algebra, geometry) representing three levels of cognitive demand (computation, comprehension, application) and two problem contexts (real, abstract)

Format: preliminary form, four trial forms, two pilot forms, two final forms

Sample: 121 students in a women's college

Reliability: not specified in abstract

Correlations: Correlations between expressions of confidence and performance ranged from .45 to .54, with correlations stronger for computation than for application problems.

Validity: not specified in abstract

Reference: Dowling, Delia Mary. The Development of a Mathematics Confidence Scale and Its Application in the Study of Confidence in Women College Students. (The Ohio State University, 1978.) *Dissertation Abstracts International* 39A: 4790; February 1979. (Order No. 7902111)

Title: Mathematics Vocabulary Test

Developed by: D. G. Ebeling

Content: 12 terms related to properties and operations of whole numbers

Format: 36 items

Sample: 1094 sixth-grade pupils in 19 schools

Reliability: not specified in abstract

Correlations: A positive correlation was found between the test and each of five achievement tests.

Validity: Use of terms in seven elementary mathematics textbook series was analyzed. After a pilot test on the initial set of items, a second form of the test was designed and submitted to a panel of 11 mathematics educators. The final form was produced on the basis of their recommendations.

Reference: Ebeling, David George. The Ability of Sixth Grade Students to Associate Mathematical Terms with Related Algorithms. (Indiana University, 1973.) Dissertation Abstracts International 34A: 7514-7515; June 1974. (Order No. 74-2646)

Title: *Sentential Logic Test*

Developed by: T. A. Eisenberg and R. L. McGinty

Content: sentential logic

Format: 30 items in 6 categories; each question had a two-part hypothesis. (Items included.)

Sample: 50 students in grades 2 and 3 and 154 preservice elementary education majors

Reliability: r = .69 (test-retest) with elementary school students; r = .75 (split-half) with college students

Correlations: not specified in article

Validity: "Canons of formal logic dictated the validity of the test."

Reference: Eisenberg, Theodore A. and McGinty, Robert L. On Comparing Error Patterns and the Effect of Maturation in a Unit on Sentential Logic. *Journal for Research in Mathematics Education* 5: 225-237; November 1974.

Title: Fennema-Sherman Mathematics Attitudes Scales

Developed by: E. Fennema and J. Sherman

Content: attitudes toward mathematics: confidence in learning mathematics, perception of teacher's attitudes toward one as a learner of mathematics, usefulness of mathematics, perception of mother's attitudes toward one as a learner of mathematics, attitude toward success in mathematics, effectance motivation in mathematics, mathematics anxiety, perception of father's attitudes toward one as a learner of mathematics, and mathematics as a male domain.

Format: 9 scales to measure domain-specific attitudes; each scale has 12 items (6 stated negatively and 6 positively) with five Likert-type response options

Sample: Pilot instrument (173 items) administered to 368 students. Final instrument administered to 1233 students in grades 9-12, 1330 students in grades 6-8.

Reliability: $r = \geq .89$ for each scale (split-half)

Correlations: Inter-scale correlations determined.

Validity: Definitions and dimensions of the scales were agreed upon, following a literature search. Items were written and independently judged for content validity. Final items for each scale selected on basis of correlation with total score and differentiation between students who elected to take mathematics and those who did not.

Factor analysis on item responses indicated 8 factors, 4 for males and 4 for females.

References: Fennema, Elizabeth and Sherman, Julia A. Fennema-Sherman Mathematics Attitudes Scales: Instruments Designed to Measure Attitudes Toward the Learning of Mathematics by Females and Males. Journal for Research in Mathematics Education 7: 324-326; November 1976.

Available from: JSAS: Catalog of Selected Documents in Psychology. American Psychological Association, 1200 17th Street NW, Washington, D.C. 20036.

Broadbooks, Wendy J.; Elmore, Patricia B.; Pedersen, Katherine; and Bleyer, Dorothy R. A Construct Validation Study of the Fennema-Sherman Mathematics Attitudes Scales. Educational and Psychological Measurement 41: 551-557; Summer 1981.

Title: *"Attitudes Toward Mathematics"*

Developed by: T. L. Flinn

Content: attitude toward mathematics

Format: 110 Likert-type items, arranged in five subscales (Place of Mathematics in Society and Education, Teaching of Mathematics, Problem Solving, Word Problems, and Difficulties of Learning Mathematics)

Sample: Preliminary form of 144 items, arranged in six subscales, administered to 186 college freshmen in an algebra course. Revised after item analysis.

Reliability: Tests indicate it is "highly reliable".

Correlations: not specified in abstract

Validity: Items for the preliminary form were taken from several sources, including essays written by students, relevant ideas from other attitude scales, and informal discussions with students, teachers, and others.

Tests indicate it is "a valid measure of student attitudes toward various aspects of mathematics learning."

Reference: Flinn, Timothy Lee. The Development of a Likert-Type Attitude Scale for the Measurement of Attitudes Toward Mathematics. (Texas A&M University, 1976.) *Dissertation Abstracts International* 37A: 1442; September 1976. (Order No. 76-20,583)

Title: "Multi-level Tests"

Developed by: D. W. Forbes

Content: elementary school mathematics topics

Format: 7 short, multi-level tests

Sample: grades 4-6

Reliability: grade 4, r = .86; grade 5, r = .79; grade 6, r = .81 (Kuder-Richardson Formula 20)

Correlations: r = .46 (grade 4), r = .72 (grade 5), r = .75 (grade 6) with "incumbent test"

Validity: written for objectives

Reference: Forbes, Dean W. The Use of Rasch Logistic Scaling Procedures in the Development of Short Multi-Level Arithmetic Achievement Tests for Public School Measurement. 1976. ERIC: ED 128 400.

Title: "Item-Sampling Test for Intermediate Algebra"

Developed by: D. L. Forester

Content: college intermediate algebra

Format: three sets of six test forms assembled by item sampling, each form having 10 multiple-choice questions, compared to three corresponding constant-item forms of 10 questions

Sample: administered to 101 junior college students in an intermediate algebra course as in-class midterm examinations in three different periods within the semester

Reliability: not specified in abstract

Correlations: not specified in abstract

Validity: For the constant-item test forms and the item-sampled test forms, validity coefficients of .37 and .39, .46 and .35, and .51 and .37 were found on the first, second, and third in-class examinations, respectively.

For the optimally weighted composite of three constant-item test forms and for the optimally weighted composite of three item-sampled test forms, multiple correlational coefficients of .57 and .52, respectively, were obtained.

Differences in validity coefficients for the two types of test forms were not statistically reliable.

Reference: Forester, Donald Lee. A Comparison of the Validities of an Item-Sampling Procedure and a Traditional Item-Allocation Method in the Construction of Achievement Examinations in Intermediate Algebra for Community College Students. (University of Southern California, 1976.) Dissertation Abstracts International 37A: 1466; September 1976. (Order No. not given)

Title: "*Problem Solving Tests*"

Developed by: R. A. Forsyth and K. F. Spratt

Content: problem solving

Format: 4 test forms, each with 20 mathematical problem-solving items of the type typically found on published achievement tests for junior high school students and each with a different multiple-choice item format

Sample: 988 students in grades 7 and 8

Reliability: r = .62 to .83 for each total test (Kuder-Richardson Formula 20)

Correlations: Correlations between scores on each of the four test forms and scores on the mathematics problem solving subtest of the Iowa Test of Basic Skills ranged from .59 to .76.

Validity: Some question about whether all types of items were measuring the same construct as traditional items arose.

Reference: Forsyth, Robert A. and Spratt, Kevin F. Measuring Problem Solving Ability in Mathematics with Multiple-Choice Items: The Effect of Item Format on Selected Item and Test Characteristics. *Journal of Educational Measurement* 17: 31-43; Spring 1980.

Title:	"Algebra Chapter and Retention Tests"
Developed by:	C. D. Friesen
Content:	3 chapter tests and 1 retention test on algebra content
Format:	multiple-choice items
Sample:	143 algebra students in three schools
Reliability:	r = .82, .74, .81, .80 (Kuder-Richardson Formula 20)
Correlations:	not specified in abstract
Validity:	Evaluated for content validity by a panel of four mathematics educators.
Reference:	Friesen, Charles Donovan. The Effect of Exploratory and Review Homework Exercises upon Achievement, Retention, and Attitude in a First-Year Algebra Course. (The University of Nebraska-Lincoln, 1975.) Dissertation Abstracts International 36A: 6527; April 1976. (Order No. 76-4516)

Title: *Genrich Test of Cognitive Development*

Developed by: C. J. Genrich

Content: based on Piagetian theory: preoperational level (28 items) and concrete operations level (5 items)

Format: 33-item, multiple choice, group paper-and-pencil test

Sample: administered to five samples of kindergarten and grade 1 children (n = 53 to 543)

Reliability: Stability coefficients over 5 to 19 months ranged from .48 to .60.

Correlations: Predictive and concurrent relationships of the GTCD with achievement were compared with a test of readiness and a test of intelligence using the Metropolitan Readiness Test and the Otis-Lennon Mental Abilities Test for predictions and the Cooperative Primary Tests for Reading and Mathematics for achievement. Concurrent relationships of GTCD to reading and mathematics achievement ranged from .21 to .47. For mathematics, beginning-of-year to end-of-year kindergarten correlations ranged from .33 to .49. Correlation for beginning-of-year first-grade groups was .54. Correlations between GCTD, MRT, and O-L were all less than .65.

Validity: see "Correlations"

Reference: Genrich, Carol Jean. The Evaluation of a Partially Standardized Group Test Based on Piagetian Theory Developed for Kindergarten and First-Grade Children. (University of Southern California, 1976.) *Dissertation Abstracts International* 37A: 5585-5586; March 1977. (Order No. not given)

Title: Golightly Primary Grade Geometry Test

Developed by: M. G. Golightly

Content: understandings of and ability in kindergarten and primary grade geometric concepts

Format: non-verbal group test with 85 items organized into three subtests (Shapes and Forms, Spatial Relationships, and Measurement)

Sample: 24 teachers and 144 pupils participated in pilot study. On the basis of pilot test results and a review of items by persons in mathematics and mathematics education, items revised. Final test administered in 14 schools representing 6 counties in one state (primary grades).

Reliability: $r = .86$ (Kuder-Richardson Formula 20)

Correlations: not specified in abstract

Validity: Widely used textbooks, courses of study, publications of educational and mathematical associations were examined, and experts in the field were consulted to determine major content elements desired in the tests. Content objectives, a specification chart based on Bloom's Taxonomy, and items were then developed. A content analysis indicated that the test had an appropriate spread over the content objectives and cognitive structure.

Reference: Golightly, Madelyn Gray. Construction of a Culture-Fair Primary Grade Geometry Test-Kindergarten to Grade Three. (Georgia State University-School of Education, 1976.) Dissertation Abstracts International 37A: 4931; February 1977. (Order No. 77-1544)

Title: "*Computation and Word Problem Test*"

Developed by: L. S. Goodrum, Jr.

Content: computation and word problems

Format: 20 arithmetic computation problems and 20 arithmetic word problems

Sample: pilot study with 22 pupils in grade 4

Reliability: r = .62

Correlations: not specified in abstract

Validity: not specified in abstract

Reference: Goodrum, Lloyd Smith, Jr. The Relationship of the Difference Between Arithmetic Computation and Word-Problem Solving Scores and Teacher Ratings of Oral Language Performance for Fourth-Grade Students. (Duke University, 1978.) *Dissertation Abstracts International* 39A: 2801; November 1978. (Order No. 7821307)

Title: Oral Language Performance Rating Scale

Developed by: L. S. Goodrum, Jr.

Content: arithmetic word-problem solving skills

Format: 12 items, identified by a t-test from 24 items, to yield a statistically significant difference between pupils with satisfactory and unsatisfactory problem-solving skills

Sample: 22 fourth-grade pupils

Reliability: r = .65

Correlations: not specified in abstract

Validity: r = .92 (construct validity)

Reference: Goodrum, Lloyd Smith, Jr. The Relationship of the Difference Between Arithmetic Computation and Word-Problem Solving Scores and Teacher Ratings of Oral Language Performance for Fourth-Grade Students. (Duke University, 1978.) Dissertation Abstracts International 39A: 2801; November 1978. (Order No. 7821307)

Title: "Measurement Test"

Developed by: M. Green

Content: area, capacity, temperature, hardness

Format: 76 objective-referenced items

Sample: Four tryouts of items with fourth- and fifth-grade children: (1) n = 75 and (2) n = 100 developed a draft of items for the attribute of area; (3) n = 242, the items for capacity; (4) n = 239, the items for temperature and hardness. Final set of items administered to fourth- and fifth-grade children (n = 351 and 355, respectively), using item sampling, with 12 or 13 items in each test packet.

Reliability: not specified in abstract

Correlations: not specified in abstract

Validity: "Strong support for the face validity of the items and objectives was provided by judges who matched the items and the objectives."

Reference: Green, Michael. The Development and Utilization of a Measurement Test for Intermediate Grades. (The University of Wisconsin-Madison, 1978.) Dissertation Abstracts International 40A: 1325; September 1979. (Order No. 7915098)

Title: "Test of Conditional Reasoning Ability"

Developed by: N. Hadar and L. Henkin

Content: conditional reasoning

Format: 32 items in four 8-item sets: affirmation of the antecedent, denial of the consequent, affirming the consequent, denying the antecedent

Sample: 210 pupils in grade 5

Reliability: $r = .79$ (split-half Pearson product-moment coefficient with Spearman-Brown formula for double length)

Correlations: not specified in article

Validity: "The test is a direct measure of the ability validly to infer from conditional premises. As such, its validity is by definition unquestionable."

Reference: Hadar, N. and Henkin, L. Children's Conditional Reasoning Part II: Towards a Reliable Test of Conditional Reasoning Ability. *Educational Studies in Mathematics* 9: 97-114; February 1978.

Title: Affective Reporting System

Developed by: T. Haladyna and G. Thomas

Content: attitudes toward mathematics, plus school, reading, PE, art, music, social studies, and science

Format: primary and intermediate grade versions of two instruments, ME and What I Like Best (WILB). ME for mathematics contains five items with happy, neutral, and sad faces as response option. WILB contains pair comparisons to indicate preferences for subject matters; primary, 10 items for five subject matters; intermediate, 15 items for seven subject matters.

Sample: elementary students

Reliability: ME: r = .74 to .89 for the scales of mathematics, PE, art, music, social studies, and science (internal consistency). WILB: r = .38 to .56 (primary); r = .55 to .69 (intermediate)

Correlations: not specified in article

Validity: Construct validity ascertained with factor analysis.

Reference: Haladyna, Tom and Thomas, Gregory. The Affective Reporting System. Journal of Educational Measurement 16: 49-54; Spring 1979.

Title: "Concepts Test"

Developed by: M. L. Harris and T. A. Romberg

Content: concepts of sets, division, and expressing relationships

Format: Each student received 72 items randomly assigned from a pool of 360 items (30 concept scores by 12 task scores).

Sample: 391 pupils in grades 5 and 6

Reliability: For individual items, r = .48 to .75 (concepts, boys); r = .41 to .76 (concepts, girls); r = .62 to .85 (tasks, boys); r = .58 to .85 (tasks, girls)

The reliability estimates "were sufficiently high to warrant study of the dimensionality of the mathematical concepts and the tasks."

Correlations: not specified in article

Validity: Intercorrelations of concept scores, r = .50 to .70 (boys); r = .40 to .60 (girls). Intercorrelations of task scores, r = .70 to .90 for both sexes (except for two items).

Factor analyses were also performed; "all 30 concepts are measures of a single functional relationship among the concepts."

Reference: Harris, Margaret L. and Romberg, Thomas A. An Analysis of Content and Task Dimensions of Mathematics Items Designed to Measure Level of Concept Attainment. Journal for Research in Mathematics Education 5: 72-86; March 1974.

Title: "Cognitive Preference Instrument"

Developed by: B. L. A. Heimbuch

Content: cognitive preferences of content common to elementary school mathematics programs

Format: 50 items

Sample: in-service and preservice elementary teachers and college students not in elementary education programs

Reliability: r = .87 to .91 (split-half reliability)

Correlations: not specified in abstract

Validity: Pool of developed items submitted to a panel of judges to ensure construct validity.

Reference: Heimbuch, Bonnie Lee Aufenkamp. Cognitive Preferences in Mathematics of Elementary Teachers: Identification and Relationships. (The University of Texas at Austin, 1977.) Dissertation Abstracts International 38A: 2628; November 1977. (Order No. 77-22,965)

Title: Heimer/Games Basic Competency Test in Mathematics

Developed by: R. Heimer and P. Games

Content: basic competencies in arithmetic and geometry (to provide information on level of achievement and for prescriptions)

Format: three parts: (1) basic arithmetic, 34 items on number/numeration, addition, subtraction, multiplication, and division; (2) more advanced arithmetic, 28 items on fractions, decimals, and ratio/proportion/percent; (3) informal geometry and functional literacy (applications), 27 items

Sample: Administered to "all available students" in grades 6, 8, and 10 in one school system; same test and a parallel form administered to "two different samples of the above population" two weeks later.

Reliability: Test/retest, test/parallel form correlations generally significant at the .01 or the .05 level; with KR-20 formula, all significant at the .001 level. "In terms of the data that were collected, the BCT was judged as reliable."

Correlations: Correlations were computed between test strands and subtests of the CTBS for grade 8 students and the SRA for grade 10 students; all were significant at the .01 or the .05 level.

Validity: see "Correlations"

Reference: Assaf, Ibrahim Hassan. An Evaluation of Testing Procedures for Determining Basic Competence Under Conditions Where Diagnostic/Prescriptive Information is Provided as a Basis for Corrective Teaching. (The Pennsylvania State University, 1979.) Dissertation Abstracts International 40A: 5703-5704; May 1980. (Order No. 8010017)

Title: Mathematics Eclectic Attitude Test

Developed by: J. J. Hering

Content: attitudes toward mathematics

Format: 99 items, Likert-type scale

Sample: The 99 items were randomly divided into 10 nonoverlapping subtests. The subtests were randomly distributed to 216 students from 10 randomly selected mathematics classes in grade 8.

Reliability: see "Validity"

Correlations: not specified in abstract

Validity: 99 items were constructed by pooling the nonoverlapping attitude statements from scales by Dutton and Blum, Aiken and Dreger, Adams and VonBrock, Shatkin, and the International Study of Achievement in Mathematics. This provided a reliable and valid pool of items to be used as a "mathematics attitude item universe" in a study to determine population norms of attitudes toward mathematics for eighth-grade students.

Reference: Hering, Jeffrey Justin. Utilizing Multiple Matrix Sampling Techniques to Estimate Norms of Attitudes Toward Mathematics. (The University of Toledo, 1975.) Dissertation Abstracts International 36A: 4430; January 1976. (Order No. 75-29,933)

Title: Attitude Toward Mathematics Teacher Scale

Developed by: D. Hume

Content: attitudes toward one's (college) mathematics teacher

Format: 30 Likert-type items

Sample: 90 items administered to 150 students in six classes. On the basis of item content and statistics, five experienced teachers selected 30 items. Final form administered to 894 students in 40 college undergraduate mathematics classes.

Reliability: $r = .93$ (test-retest reliability after one-week interval); $r = .92$ (coefficient alpha)

Correlations: Item-total score correlations ranged from .44 to .84.

Correlations with other scales indicated that attitude toward mathematics is distinct from factors measured by other scales.

Validity: Student comments collected for eight years provided 90 potential items.

Reference: Hume, David. A Scale to Measure Attitude Toward One's Mathematics Teacher. (The University of Tennessee, 1979. Dissertation Abstracts International 40A: 3171; December 1979. (Order No. 7927036)

Title: "Videotaped Test of Conservation"

Developed by: P. A. Isaacs

Content: number concepts; conservation of length, area, quantity, weight, and volume; horizontality

Format: 30-minute videotaped test, with actors presenting situation and three possible answers; students select one answer by sheeting on answer sheet

Sample: 586 students in grade 6 in Jamaica

Reliability: r = .47 (Pearson's r)

Correlations: comparison of data from videotaped test on horizontality and results of Mitchelmore's clinical test

Validity: factor analysis performed

Reference: Isaacs, Patricia A. Preparation and Validation of a Videotaped Test of Conservation Suitable for Grade 6 Students in Jamaica. 1981. ERIC: ED 205 384.

Title: "Mathematics Attitude Scales"

Developed by: G. W. Johnson

Content: attitude toward mathematics

Format: Likert-type scale

Sample: 264 students in grade 7, their parents, grade 7 mathematics teachers, and teachers of the previous year

Reliability: r = .88 to .93 (Kuder-Richardson Formula 21)

Correlations: Correlation between student attitude scale scores and self-rating on "Feelings About Math" scale (also constructed by the researcher) was .82.

Validity: not specified in abstract

Reference: Johnson, Guy W. A Study of Cognitive and Attitudinal Internations in Seventh Grade Mathematics. (The Louisiana State University and Agricultural and Mechanical College, 1976.) Dissertation Abstracts International 37A: 7008-7009; May 1977. (Order No. 77-10,376)

Title: "Multi-level Choice Test"

Developed by: J. J. Johnson

Content: arithmetic terms

Format: multi-level choice test with arithmetic terms written as stems and correct-choice options corresponding to two conceptual states (concrete and abstract), while a third option was a distractor

Sample: elementary students

Reliability: r = .70 (split-half reliability)

Correlations: not specified in abstract

Validity: supported by evidence that the mean multi-level test score (1) for subjects ranked as best in arithmetic is higher than for subjects ranked as poorest, (2) for older subjects is higher than for younger subjects, and (3) is not significantly different for boys and girls

Reference: Johnson, Judith Jo-Anne. A Paradigm of a Multi-Level Choice Test. (Indiana University, 1978.) Dissertation Abstracts International 39A: 5464; March 1979. (Order No. 7906252)

Title: *"Test on Perimeter, Area, and Volume"*

Developed by: R. D. Jolly

Content: selected perimeter, Area, and volume concepts

Format: not specified in abstract

Sample: pilot study with 55 boys in grade 7

Reliability: $r = .86$ (split halves)

Correlations: not specified in abstract

Validity: Items were submitted for review by a panel of judges consisting of three mathematics education professors.

Reference: Jolly, Richard Donald. A Study of the Use of a Laboratory Approach to the Teaching of Selected Concepts of Perimeter, Area, and Volume, to Seventh Grade Students. (Auburn University, 1977.) *Dissertation Abstracts International* 38A: 6586; May 1978. (Order No. 7806085)

Title: Mathematics Preference Inventory

Developed by: W. L. Jordan

Content: attitudes toward three areas of mathematics: practical applications, computations, and structural mathematics

Format: 30-item, forced-choice, objective test. Each item consists of a stem which presents a situation to which students respond by selecting one of three alternatives designed to reflect one of the three areas of mathematics. Subscale scores are summed.

Sample: 94 upperclass mathematics majors from six colleges in the New York metropolitan area (42 males, 52 females)

Reliability: r = .88, .81, and .94 respectively for the three subscales (split-half reliability). Six questionable items were not found to be effective and need to be replaced.

Correlations: not specified in abstract

Validity: not specified in abstract

Reference: Jordan, Wesley Lee. The Mathematics Preference Inventory for Comparison of Attitudes Toward Practical Applications, Computations, and Structural Mathematics. (Columbia University Teachers College, 1976.) Dissertation Abstracts International 37A: 2037-2038; October 1976. (Order No. 76-21,777)

Title: "*Two Multidimensional Attitude Instruments*"

Developed by: J. P. Kish, Jr.

Content: attitude toward mathematics: anxiety toward mathematics, perception of the usefulness of mathematics, interest in and enjoyment of mathematics, and attitude toward fractions, decimals, and percents

Format: (1) semantic differential and (2) Likert scale, each with four subscales

Sample: five classrooms each in grades 7 and 8

Reliability: r = .66 to .95 for subscales (Cronbach's coefficient alpha)

Correlations: not specified in abstract

Validity: construct validity; coefficients ranged from .51 to .76

Reference: Kish, John Paul, Jr. Application of the Multitrait-Multimethod Matrix and Factor Analysis Techniques to Develop a Construct Valid Mathematics Attitude Scale for Junior High School Pupils. (The University of Toledo, 1980.) *Dissertation Abstracts International* 41B: 1395; October 1980. (Order No. 8021984)

Title: *Klein Mathematics Inventory*

Developed by: E. B. Klein

Content: assessment of mathematical abilities of children upon entrance to first grade (10 general areas)

Format: pictorial items; mode of response involves drawing a circle or line, or filling in a space

Sample: 96 kindergarten students from five schools in one system

Reliability: r = .91, test-retest (Pearson Product Moment Correlation);
r = .90, internal consistency (Kuder-Richardson Formula 20)

Correlations: see "Validity"

Validity: Content determined "from a thorough study of mathematics curriculum sources for the kindergarten year. Ten general areas were identified, and 60 pictorial items were developed to test the content."

r = .85, concurrent validity (Pearson Product Moment Correlation) with the mathematics subtest of the Stanford Early School Achievement Test.

Reference: Klein, Evelyn Barbara. An Instrument for Appraisal of Children's Quantitative Abilities Prior to Formal Mathematics Instruction in Grade One. (Temple University, 1979.) *Dissertation Abstracts International* 40A: 2468-2469; November 1979. (Order No. 7924066)

Title: "Diagnostic Test for Calculus"

Developed by: M. Lazorack

Content: calculus

Format: five-response multiple-choice diagnostic test

Sample: 151 high school students known to have completed all mathematics prerequisite to calculus; also tried with 10 students enrolled for the calculus course in a community college

Reliability: $r = .92$

Correlations: not specified in abstract

Validity: Content validity assured by "(1) adherence to a prepared outline of test construction procedures, and (2) scrutiny of the test by two separate panels of judges."

Seven of nine community college students deemed by the test to need remediation later successfully completed the calculus course.

Reference: Lazorack, Metro. Diagnostic Pretesting and Remediation for Calculus Students in Blue Ridge Community College. (University of Virginia, 1973.) Dissertation Abstracts International 34A: 4086; January 1974. (Order No. 73-31,140)

Title: "Diagnostic Measures to Assess Development in Addition and Subtraction"

Developed by: J. R. Long

Content: diagnostic measures to assess child's level of skill and concept development in addition and subtraction

Format: test correlated with technique of giving "ambiguous verbal stimulus to which child was asked to respond"; used symbolic representations only (not concrete or pictorial modes)

Sample: elementary children

Reliability: r = .85 for addition, r = .81 for subtraction (Pearson Product-Moment Correlation) (confidence intervals .75 to .91 for addition, .66 to .90 for subtraction)

Correlations: technique correlated with test

Validity: not specified in abstract

Reference: Long, Jacqueline Resh. A Study to Determine the Effectiveness of a Technique Employing an Ambiguous Stimulus for Assessing a Child's Level of Skill and Concept Development in the Areas of Addition and Subtraction. (Michigan State University, 1975.) *Dissertation Abstracts International* 36A: 7918; June 1976. (Order No. 76-12,483)

Title: Instructional Styles Inventory

Developed by: R. Lopez

Content: instructional styles (including Independence, Numeric, Influence, Organization, Detail, Authority, Numeric Inanimate, Competition)

Format: not specified in abstract

Sample: 50 university faculty (reliability); 133 mathematics and 135 social science community college teachers (validity)

Reliability: r = .17 to .77 (test-retest)

Correlations: not specified in abstract

Validity: concurrent validity determined, but difficult to interpret "because of questionable reliability of the scale"

Reference: Lopez, Richard. A Concurrent Validation of the Instructional Styles Inventory Using Community College Math and Social Science Teachers. (Florida Atlantic University, 1977.) Dissertation Abstracts International 38A: 92-93; July 1977. (Order No. 77-15,324)

Title: "Attitudes Toward Mathematics"

Developed by: L. A. Michaels and R. A. Forsyth

Content: attitudes toward mathematics: enjoyment of (a) word and (b) pictorial problems, appreciation of the utility of mathematics, and security with mathematics

Format: one 12-item scale for the two enjoyment constructs; two 10-item scales for the appreciation and security constructs, all using a Likert three-point response scale

Sample: preliminary version administered to 22 students in grade 7, then modified; final version administered to 299 students in grade 7

Reliability: $r = .61, .51, .78, .78$ for each of the four scales (Spearman Brown split-half)

Correlations: Correlations of the four scale scores and three scores on the Iowa Test of Basic Skills ranged from -.16 to .26.

Validity: Some evidence of construct validity was found. The low correlations with the ITBS indicate that something other than achievement was being measured by the scales. Some degree of both convergent and discriminant validity was found.

Reference: Michaels, Linda A. and Forsyth, Robert A. Construction and Validation of an Instrument Measuring Certain Attitudes Toward Mathematics. Educational and Psychological Measurement 37: 1043-1049; Winter 1977.

Title: "*Division Test*"

Developed by: G. F. Miller

Content: division

Format: 30 items, two forms

Sample: 447 students in grade 7

Reliability: $r = .97$

Correlations: not specified in abstract

Validity: determined by a panel of experts

Reference: Miller, Glenn Franklin. An Evaluation of Diagnostic Teaching as an Approach to Improving Computational Skills with Seventh Grade Students in Four Junior High Schools in the Arlington County, Virginia, Public Schools. (The George Washington University, 1975.) *Dissertation Abstracts International* 36A; 1922; October 1975. (Order No. 75-23,410)

Title: Estimate of Self-Competence Scale

Developed by: S. J. Motowidlo

Content: assessment of the trait of generalized expectancy of task success

Format: 12 items

Sample: 131 university students (initial test); 150 university students (reliability test)

Reliability: r = .78 (internal consistency)
r = .86 (test-retest)

Correlations: Significant correlations with several measures presumed to tap the construct (convergent validity). Lower correlations with two measures of ability (divergent validity).

Validity: Initial item pool formed; 12 items selected through correlational and factor anayltic procedures.

See also "Correlations".

Reference: Motowidlo, Stephan Joseph. A Laboratory Study of the Effects of Situational Characteristics and Individual Differences on Expectancy of Task Success and Motivation to Perform a Numerical Task. (University of Minnesota, 1976.) Dissertation Abstracts International 37B: 3131; December 1976. (Order No. 76-27,822)

Title: Iowa Problem Solving Project Test

Developed by: T. M. Oehmke (with H. L. Schoen)

Content: problem solving

Format: 30-item multiple-choice test designed to provide individual and class profiles on three steps (10 items on each subtest) of problem-solving performance (getting to know the problem, doing it, and looking back)

Sample: 1000 students each in grades 5-8 (reliability). Two classes in grade 5 (validity).

Reliability: r = .63 (specific step) to .86 (entire test) (Kuder-Richardson Formula 8)

Correlations: Correlated with Iowa Test of Basic Skills (Reading Comprehension, Reading Graphs and Tables, Mathematics Concepts, and Mathematics Problem Solving): step 2 held the least relationship, while step 3 appeared most highly related in grades 5 and 6. Of the four ITBS subtests, Reading Graphs and Tables and Mathematics Concepts were most highly related to the Iowa Problem Solving Project Test; Reading Comprehension was the least related. The IPSP test was testing skills and abilities not tested by the ITBS; the IPSP subtest scores were no more highly related than the ITBS subtests which on the face of it have quite different content.

Validity: Relationship between test and interview data from students "thinking aloud" as they solved the problems was "quite high".

Reference: Oehmke, Theresa Maria. The Development and Validation of a Testing Instrument to Measure Problem Solving Skills of Children in Grades Five Through Eight. (The University of Iowa, 1979.) Dissertation Abstracts International 40A: 6179; June 1980. (Order No. 8012402)

Title: Requisite Test for the Course of Trigonometry and Analytic Geometry (MAT-111)

Developed by: M. A. Olivares et al.

Content: diagnostic entrance and prerequisite test for students about to take a first university course in trigonometry and analytic geometry

Format: 50 multiple-choice items (30 in algebra, 20 in geometry)

Sample: 538 students in 1977; 477 students in 1978

Reliability: r = .73 in 1977 (Kuder-Richardson Formula 21);
r = .98 in 1978 (Kuder-Richardson Formula 20 and Gulliksen)

Validity: based on 50 selected objectives

Reference: Olivares, Maria Angelica et al. Requisite Test for a First Course in Trigonometry and Analytic Geometry (MAT-111) at the Catholic University of Chile. Santiago: Catholic University of Chile, 1978. ERIC: ED 196 686.

Title: "Achievement Test" and "Attitude Scale"

Developed by: M. W. Paolini

Content: concepts and principles; attitudes

Format: not specified in abstract

Sample: 16 kindergarten pupils

Reliability: r = .82 (achievement) (Kuder-Richardson Formula 20); r = .79 (attitude) (Kuder-Richardson Formula 20)

Correlations: not specified in abstract

Validity: Content validity was shown by the fact "that the test items were constructed to measure concepts and principles considered basic by authorities in the field of mathematics".

Reference: Paolini, Mary Wagner. The Use of Manipulative Materials Versus Non-Manipulative Materials in a Kindergarten Mathematics Program. (University of South Dakota, 1977.) Dissertation Abstracts International 39A: 5382; March 1979. (Order No. 7904927)

Title: *P-test*

Developed by: J. D. Parete, Jr.

Content: levels of concrete and formal reasoning abilities

Format: group-administered, paper-and-pencil test

Sample: 231 college freshmen (27 students involved in validity test)

Reliability: see "Validity"

Correlations: r = .72 (multiple correlation to predict Math ACT standard scores)

Validity: Four Piagetian tasks were selected as models for the construction of four sections of questions on the test (Pendulum Task, Measurement of a Triangle, Flexible Rods Task, and Proportional Reasoning Task). Correlation of 27 students' scores on Pendulum Task and Colorless Chemical Liquids Task as a clinical interview, r = .72. Multiple regression with P-test tasks used as variables to predict interview scores yielded a multiple R = .79. Sample responses to P-test tasks and Piagetian tasks also compared.

Reference: Parete, Jesse David, Jr. Formal Reasoning Abilities of College Age Students: An Investigation of the Concrete and Formal Reasoning Stages Formulated by Jean Piaget. (The Ohio State University, 1978.) *Dissertation Abstracts International* 39A: 6006; April 1979. (Order No. 7908195)

Title: Money Achievement Test and "Money Attitude Test"

Developed by: R. S. Piccirilli

Content: achievement: knowledge and skill with money
attitude: predisposition toward learning about money

Format: achievement: 35 items with content subtests (mathematical and social aspects of money) and process subtests (lower and higher cognitive processes employed);
attitude: 45 Likert-scale items (money experience, money anxiety, materialism, and sex-typing of money)

Sample: 180 pupils in grade 4

Reliability: r = .90, .83, .81, .71, .87 (achievement)
r = .61, .74, .75, .65 (attitude)

Correlations: not specified in abstract

Validity: not specified in abstract

Reference: Piccirilli, Richard S. Achievement and Attitude Concerning Money. (State University of New York at Buffalo, 1979.) Dissertation Abstracts International 40A: 5350-5351; April 1980. (Order No. 8005700)

Title: Mathematics Anxiety Rating Scale (MARS)

Developed by: F. C. Richardson and R. M. Suinn

Content: mathematics anxiety

Format: 94 potentially anxiety-arousing situations with responses on a five-point scale

Sample: college students

Reliability: "shown to be reliable"

Correlations: not specified

Validity: "shown to be valid"

References: Brush, Lorelei R. A Validation Study of the Mathematics Anxiety Rating Scale (MARS). Educational and Psychological Measurement 38: 485-490; Summer 1978.

Richardson, F. C. and Suinn, R. M. The Mathematics Anxiety Rating Scale: Psychometric Data. Journal of Counseling Psychology 19: 551-554; 1972.

Richardson, F. C. and Suinn, R. M. A Comparison of Traditional Systematic Desensitization, Accelerated Mass Desensitization, and Anxiety Management Training in the Treatment of Mathematics Anxiety. Behavior Therapy 4: 212-218; 1973.

Morris, Larry W.; Kellaway, Dale S.; and Smith, Donna H. Mathematics Anxiety Rating Scale: Predicting Anxiety Experiences and Academic Performance in Two Groups of Students. Journal of Educational Psychology 70: 589-594; August 1978.

Suinn, R. M.; Edie, C. A.; Nicoletti, J.; and Spinelli, R. The MARS, A Measure of Mathematics Anxiety: Psychometric Data. Journal of Clinical Psychology 28: 373-375; 1972.

Title: A New Test of Understandings of Selected Number Properties of the Whole Number System: Primary Form

Developed by: G. A. N. Rossi

Content: understanding of selected number properties and concepts of the whole number system (cardinal number; ordinal number; numeral recognition; one-to-one correspondence; decimal place value for ones, tens, hundreds; commutative property for addition; associative property for addition; identity element for addition and subtraction)

Format: multiple-choice, paper-and-pencil test

Sample: 23 first-grade classrooms (n = 427) and 24 second-grade classrooms (n = 495)

Reliability: r = .91 (Kuder-Richardson Formula 20)

Correlations: Subtest and Ashlock's test found to be nominally parallel, but not statistically parallel; r = .82 between the two tests.

See also "Validity"

Validity: Test constructed to contain a subtest parallel to Ashlock's test; employed test format, content dimensions, and direction guide used by Ashlock. The test was found to have "fairly high content validity by judges in mathematics and mathematics education." Concurrent validity with the Otis-Lennon Mental Ability Test, r = .61.

Reference: Rossi, Geraldine Ann Nardi. A New Test of Understandings of the Whole Number System: Primary Form. (Indiana University, 1975.) Dissertation Abstracts International 36A: 5809; March 1976. (Order No. 76-6293)

Title: Maryland Diagnostic Arithmetic Test

Developed by: B. R. Sadowski

Content: sections on computation, sentence solving, one-step verbal problem solving, decimal numeration, principles of computation, and meanings and models for each of the four basic arithmetic operations with whole numbers

Format: group-administered test; each section "divided into homogeneous domains consisting of four or five items", with 45 domains tested

Sample: 515 pupils in grades 4 and 5 in three schools

Reliability: 21 of the 45 domains "were both reliable and homogeneous", indicating some diagnostic validity for the test

Correlations: not specified in abstract

Validity: Test scores compared with interview data. Content validity was investigated by having four content specialists classify each test item by category and then match the item to a content objective within the category; agreement was "substantial"(99% for category, 92% for content objective within category)

Reference: Sadowski, Barbara Rose. An Investigation of the Validity, Accuracy and Consistency of Prescriptions Derived from a Domain-Referenced Diagnostic Arithmetic Test and Interview Protocols. (University of Maryland, 1978.) Dissertation Abstracts International 40A: 1422; September 1979. (Order No. 7920757)

Title: Mathematics Attitude Inventory

Developed by: R. S. Sandman

Content: attitudes toward mathematics

Format: 48 items; multidimensional, with six scales of eight Likert-type items: (1) perception of the mathematics teacher, (2) anxiety toward mathematics, (3) value of mathematics in society, (4) self-concept in mathematics, (5) enjoyment of mathematics, and (6) motivation in mathematics

Sample: 2547 students in grades 7 and 8; 5034 students in grades 8 and 11

Reliability: r = .68 to .89 (Cronbach's alpha)

Correlations: not specified in abstract or article

Validity: Factor analysis yielded six common factors, "easily identified with the six constructs that the instrument was designed to measure. Thus support was provided for the construct validity of the instrument."

References: Sandman, Richard Simon. The Development, Validation, and Application of a Multidimensional Mathematics Attitude Instrument. (University of Minnesota, 1973.) Dissertation Abstracts International 34A: 7054-7055; May 1974. (Order No. 74-10,626)

Sandman, Richard S. The Mathematics Attitude Inventory: Instrument and User's Manual. Journal for Research in Mathematics Education 11: 148-149; March 1980.

Sandman, R. S. Mathematics Attitude Inventory and MAI User's Manual. Available from Minnesota Research and Evaluation Center, 210 Burton Hall, University of Minnesota, Minneapolis, Minnesota 55455.

Title: "Diagnostic Mathematics Tests"

Developed by: D. S. Sheehan and R. G. Davis

Content: 7 major skill areas emphasized in textbooks used in Dallas Independent School District

Format: 1 test per grade level K-8; 4 items per objective with 4 alternate answers per item

Sample: 116 randomly selected classes

Reliability: For one randomly sampled objective (subtest) at each level: grade 2 (identifying missing addend or sum), r = .57; grade 5 (identifying missing sum or addend), r = .69; grade 8 (identifying square roots), r = .61 (Cohen's).

Correlations: not specified in article

Validity: Performance objectives written by a task force; reviewed by a random sample of 132 teachers, who rank-ordered each objective by its relative importance to others in each skill area, and by staff, task force, and consultant. Test items developed to reflect each objective and two preliminary forms constructed.

Statistical tests limited to one randomly selected objective at grade 2, r = .51; grade 5, r = .56; grade 8, r = .49 (Cohen's).

Reference: Sheehan, Daniel S. and Davis, Robbie G. The Development and Validation of a Criterion-Referenced Mathematics Battery. School Science and Mathematics 79: 125-132; February 1979.

Title: Project Success Evaluative Survey

Developed by: M. A. Sherry

Content: arithmetic

Format: not specified in abstract

Sample: pupils in grade 6 in two schools

Reliability: r = .86 (Kuder-Richardson Formula 20)

Correlations: r = .37 with Comprehensive Test of Basic Skills (Pearson Product-Moment Correlation)

Validity: Content validity determined by a panel of specialists and by correspondence with a nationally normed test (CTBS). Of 438 objectives, 146 were tested by the CTBS, 369 by the Survey.

Reference: Sherry, Margaret Ann. Individualized Contrasted with Traditional Instruction in Sixth Grade Arithmetic Classes. (University of Southern California, 1974.) Dissertation Abstracts International 35A: 6010-6011; March 1975. (Order No. 75-6445)

Title: "Attitude of Teachers Toward Metrication"

Developed by: R. L. Shrigley and C. R. Trueblood

Content: attitude toward metrication

Format: 19 items written and tested with others generated as the development proceeded; final form had 22 items using Likert-type scale

Sample: 267 preservice elementary and special education teachers

Reliability: r = .91 (coefficient alpha)

Correlations: Intercorrelations of items were found.

Validity: Factor analysis indicated content validity.

Reference: Shrigley, Robert L. and Trueblood, Cecil R. Designing a Likert-Type Scale to Assess Attitude Toward Metrication. Journal of Research in Science Teaching 16: 73-78; January 1979.

Title:	"Metric Measurement Test"
Developed by:	J. J. Slobojan
Content:	metric measures for length, area, volume, and mass
Format:	multiple choice
Sample:	92 students in grades 7, 8
Reliability:	r = .79 (Kuder-Richardson Formula 20)
Correlations:	not specified in abstract
Validity:	content validity evaluated by a panel of mathematics educators
Reference:	Slobojan, Joseph John. A Comparison of Two Strategies for Teaching Middle School Students to Utilize Basic Concepts of Measurement Within the International (Metric) System. (University of Northern Colorado, 1974.) Dissertation Abstracts International 35B: 5534; May 1975. (Order No. 75-5440)

Title: "*Mathematics Achievement Test*"

Developed by: A. F. Smith

Content: comprehensive final semester examination for a mathematics course for elementary education majors

Format: multiple choice

Sample: 297 college students in 14 sections

Reliability: r = .79

Correlations: not specified in abstract

Validity: judged for content validity by a jury of faculty members

Reference: Smith, Arthur Frederick. Effects on Achievement in a College Mathematics Course for Prospective Elementary Teachers of Different Ways of Providing Reinforcement Through Homework Exercises. (The University of Connecticut, 1975.) *Dissertation Abstracts International* 36A: 4435; January 1976. (Order No. 76-1711)

Title: "*Statistics Test*"

Developed by: C. D. Smith

Content: statistics

Format: 60 multiple-choice items

Sample: 134 college students in 6 sections

Reliability: r = .89 (Kuder-Richardson Formula 20)

Correlations: not specified in abstract

Validity: content validity judged by a jury of faculty members

Reference: Smith, Charles David. Formative Evaluation and Achievement in Large Statistics Classes at the College Level. (The University of Connecticut, 1977.) *Dissertation Abstracts International* 38A: 4640-4641; February 1978. (Order No. 7731222)

Title: Metric System Attitude Scale

Developed by: R. J. Sovchik

Content: attitudes toward the metric system

Format: 20 items, using a 5-point Likert scale

Sample: a group of elementary school teachers, a group of sixth-grade partents, and two sections of preservice teachers in mathematics method course

Reliability: r = .94 to .97

Correlations: not specified in article

Validity: The scale was derived from Aiken's Mathematics Attitude Scale; thus, "face validity was ascertained by the manner in which the instrument was constructed. However, predictive validity and construct validity need to be further studied."

Reference: Sovchik, Robert J. The Reliability of a Metric System Attitude Scale. School Science and Mathematics 80: 327-330; April 1980.

Title: "Number Systems Test"

Developed by: R. J. Sovchik

Content: number systems

Format: 60 items, 10 subtests

Sample: 139 prospective elementary teachers (pretest), 143 prospective elementary teachers (posttest)

Reliability: r = .70 (Kuder-Richardson Formula 20) (total test); r = .06 to .55 (subtests)

Correlations: see "Validity"

Validity: Four cognitive objectives were written and taxonomized according to the rationale of the Cognitive Taxonomy. Construct validity was analyzed by performing several alpha factor analyses; these did not reflect the four cognitive objectives of the course.

Predictive validity was analyzed by computing three Pearson Product-Moment Correlation Coefficients and a part correlation coefficient; r = .49 between the ACT Mathematics Subtest and the pretest, with a part correlation of .31 between the ACT subtest and the posttest.

Guttman scale analyses for each subtest yielded the following coefficients of reproducibility: Objective I, .76; Objective II, .75; Objective III, .73; Objective IV, .66.

Reference: Sovchik, Robert John. A Taxonomic Approach to the Evaluation of a Beginning Number Systems Course for Prospective Elementary School Teachers. (Kent State University, 1974.) Dissertation Abstracts International 35A: 6562-6563; April 1975. (Order No. 75-7466)

Title: Syracuse Mathematics Anxiety Scale

Developed by: R. R. Sudweeks, S. Stoler, and M. Croker

Content: mathematics anxiety: anxiety toward formal learning situations involving the study of mathematics and anxiety toward the use of mathematics in everyday situations

Format: 18 Likert-type items

Sample: 41-item pilot version administered to 52 students in grades 11 and 12; collapsed to one scale of 18 items and administered to 73 college freshmen, then to 917 college freshmen

Reliability: r = .84 (test-retest); r = .95 (Cronbach's alpha)

Correlations: Correlated with a 10-item scale measuring general anxiety toward school or formal learning situations, r = .34; with a 19-item confidence in mathematics problem-solving scale, r = -.62; and with a measure of foreign language anxiety, r = .03.

Validity: Items written to represent six cells on a matrix. Construct validity supported by negative and low correlations with other scales (see "Correlations").

Reference: Sudweeks, Richard R.; Stoler, S.; and Croker, M. Development of the Syracuse Mathematics Anxiety Scale. April 1980. ERIC: ED 186 266.

Title: "Calculus Test"

Developed by: M. L. Swaney

Content: calculus

Format: 10 items

Sample: 39 college students

Reliability: r = .77 (Cronbach's alpha)

Correlations: r = .76 with hourly examinations

Validity: not specified in abstract

Reference: Swaney, Michael Loren. A Study on the Relative Merits of a Summary and Two Summarizers -- Variants of David P. Ausubel's Organizer -- with Respect to Student Achievement in Elementary Calculus. (University of Maryland, 1974.) Dissertation Abstracts International 36A: 245-246; July 1975. (Order No. 75-11,269)

Title: "*Waiver Test for Math Content Courses*"

Developed by: M. N. Tolman

Content: college mathematics

Format: 58 multiple-choice items

Sample: prospective elementary teachers

Reliability: r = .87 (Kuder-Richardson Formula 20)

Correlations: see "Validity"

Validity: "Care was taken in the construction and validation of the instrument to assure content validity with college-level texts designed for such courses and elementary texts which the teacher is expected to use in the teaching situation."

Correlations with final grades resulted in a coefficient significant at the .01 level, "indicating high predictive validity of the instrument with actual success in the course."

Reference: Tolman, Marvin Nelson. Development and Validation of a Waiver Test for the Math Content Courses Required of Elementary Education Majors at Utah State University. (Utah State University, 1975.) *Dissertation Abstracts International* 37A: 2800; November 1976. (Order No. 76-25,636)

Title: *Dixon Elementary Achievement Test*

Developed by: G. D. Vannice

Content: arithmetic computation (also word recognition and spelling)

Format: not specified in abstract

Sample: 54 elementary pupils (reliability); 230 pupils (validity)

Reliability: r = .95 to .99 (test-retest)

Correlations: see "Validity"

Validity: r = .29 to .62 with teacher ratings: "The DEAT Arithmetic Computation subtest appears to bear only a modest relationship with teacher ratings, as do the Stanford math subtests. More evidence is needed regarding the concurrent validity of the Arithmetic Computation subtest of the DEAT before its validity can be assured."

Reference: Vannice, Gary Dean. Development and Validation of an Achievement Test for Use with Elementary School Pupils. (University of Southern California, 1976.) *Dissertation Abstracts International* 36A: 7314-7315; May 1976. (Order No. not given)

Title: Romberg-Wearne Mathematical Problem Solving Test

Developed by: D. C. Wearne and T. A. Romberg

Content: mathematical problem solving

Format: Each problem-solving question was preceded by two other questions: one to assess understanding of the information in the stem of the problem-solving question (comprehension) and one to assess knowledge of an underlying concept of the problem-solving question (application).

Sample: elementary pupils

Reliability: r = .84 (Hoyt estimate)
r = .79 (Kuder-Richardson Formula 20)

Correlations: not specified in abstract

Validity: Content validity was measured by a panel of judges interested in research in problem solving; their classification of items was compared to the classification of items on the test. The computed measure of association was .78.

Reference: Wearne, Diana Catherine. Development of a Test of Mathematical Problem Solving Which Yields a Comprehension, Application, and Problem Solving Score. (The University of Wisconsin-Madison, 1976.) Dissertation Abstracts International 37A: 6328-6329; April 1977. (Order No. 76-29,945)

Title: "Language Variation Test"

Developed by: J. S. Westmoreland

Content: problems involving addition and subtraction basic facts with numbers 0-5

Format: Two parallel 60-item tests were developed: Test A treated each of the chosen number facts in unsophisticated arithmetic language; Test B treated the same facts in sophisticated language. Each test was divided into four parallel subtests, each corresponding to a level of performance (concrete, semi-concrete, vocal abstract, and written abstract). Twenty problems within each test (A and B) were chosen to elicit constructed responses; all others used the selected response mode.

Sample: 866 first-grade entrants

Reliability: r = .94 (Kuder-Richardson Formula 20, Spearman-Brown Reliability Formula)

Correlations: r = .51, Test A with arithmetic portion of Metropolitan Readiness Test, Form A; r = .46, Test B with MRT.

r = .85, Test A with Test B.

Validity: determined from the consensus of eight authorities in the field of elementary mathematics education

Reference: Westmoreland, John Somers. First Grade Entrants' Arithmetic Problem-Solving Behavior as Influenced by Language Variation and Sex. (Indiana University, 1974.) Dissertation Abstracts International 35A: 5796; March 1975. (Order No. 75-5582)

Title: "Metric Skills"

Developed by: R. L. Williams

Content: metric measures of length (14 items), volume (18 items), mass (10 items), and temperature (6 items)

Format: 48 multiple-choice items, with 12 items for each metric skill area: estimation, conversion, measurement, and use of units and symbols

Sample: 72 intermediate grade pupils

Reliability: r = .85 (split-half)

Correlations: see "Validity"

Validity: Concurrent validity was established through correlating multiple-choice items with matching performance items, and correlating total results with results on the McFee Metric Test (r = .70).

Content validity was determined by using a panel of metric experts.

Reference: Williams, Richard Lee. A Comparative Study of Metric Skills of Intermediate Students in Calgary, Alberta, and Spokane, Washington. (Washington State University, 1978.) Dissertation Abstracts International 39A: 4851-4852; February 1979. (Order No. 7903602)

Title: "Test on Critical Thinking in a Mathematical Context"

Developed by: P. H. Wozniak

Content: critical thinking in a mathematical context

Format: 37 items in a four-response, multiple-choice, paper-and-pencil format

Sample: 214 students in 9 classes in grades 8-12

Reliability: r = .74 (Kuder-Richardson Formula 20)

Correlations: Age and scores from the California Test of Mental Maturity were significant predictors of critical thinking as measured by the instrument.

Validity: Categories for initial items were among those used by Jansson in an instrument to assess critical thinking abilities, including definition, deduction, assumption, ambiguity, and conjecture. Following interviews with 41 students, items were revised. The test was then administrered to 69 eighth-grade students in written form and items were again revised to make the final form.

"The instrument produced satisfactory measures of validity, determined by input from a reading committee, correlations with outside criteria, and correlations between rankings on the interviews and scores on the final instrument."

Factor analysis indicated two distinct factors: Deduction and Conjecture.

Reference: Wozniak, Paul Henry. The Measurement of Certain Aspects of Critical Thinking in a Mathematical Context. (The Ohio State University, 1976.) Dissertation Abstracts International 37A: 4940; February 1977. (Order No. 77-2538)

Title: "Rating Teacher Effectiveness"

Developed by: D. F. Wright

Content: teacher effectiveness

Format: 21 items

Sample: 19 elementary algebra classes in five community colleges

Reliability: r = .90 (Cronbach's alpha)

Correlations: correlated with achievement, .51 to .62

Validity: Twenty items were based on results from a study by Romine and Newport (1973).

Reference: Wright, D. Franklin. Correlation Between Mean Classroom Scores on Student Ratings of Teachers and Mean Classroom Scores on Teacher Effectivenss in Elementary Algebra in California Community Colleges. (University of Colorado, 1974.) Dissertation Abstracts International 35A: 6377; April 1975. (Order No. 75-3771)

Title: "*Problem Solving Test*"

Developed by: D. L. Zalewski

Content: problem solving

Format: two 20-item paper-and-pencil tests

Sample: 63 students in grade 7 with average and above-average mathematics achievement records

Reliability: r = .68 to .84 (Hoyt's reliability coefficient)

Correlations: Correlations between scores on test and interviews ascertained; r = .68 for one of the two tests.

Validity: See "Correlations"

References: Zalewski, Donald L. *An Exploratory Study to Compare Two Performance Measures: An Interview-Coding Scheme of Mathematical Problem Solving and a Written Test. Parts 1 and 2*. Technical Report No. 306. Madison: University of Wisconsin Research and Development Center for Cognitive Learning, 1974. ERIC: ED 100 718, ED 100 719.

Zalewski, Donald Lawrence. An Exploratory Study to Compare Two Performance Measures: An Interview-Coding Scheme of Mathematical Problem Solving and a Written Test. (The University of Wisconsin-Madison, 1974.) *Dissertation Abstracts International* 35A: 5797-5798; March 1975. (Order No. 74-27,771)

Title: CREATE

Developed by: E. D. Zosa

Content: creative ability in mathematics

Format: not specified in abstract

Sample: 235 seventh-grade pupils in five schools

Reliability: r = .61 (coefficient alpha)
r = .70 (test-retest)

Correlations: r = .41 with aptitude; r = .41 between aptitude and fluency and flexibility scores (A); r = .09 between aptitude and originality scores (OR).

r = .59 with general educational ability; r = .50 between general ability and A; r = .11 between general ability and OR.

r = .18 with general creativity; r = .16 between general creativity and A; r = .10 between general creativity and OR.

Validity: The low correlation between fluency and flexibility scores (A) and originality scores (OR) "seems to indicate that the instrument measures two different qualities of creative ability in mathematics."

Reference: Zosa, Evangelina Delgado. The Construction of a Test to Measure Creative Ability in Mathematics. (Columbia University Teachers College, 1978.) Dissertation Abstracts International 39A: 6009; April 1979. (Order No. 7909036)

Title: Student Attitude Questionnaire

Developed by: Mathematical Problem Solving Project evaluation staff

Content: attitudes related to problem solving: willingness, confidence, and perseverence

Format: 20 items on five-point scale

Sample: 195 students in grade 4, 277 students in grade 5, and 364 students in grade 6

Reliability: r = .71, total scale; r = .57, willingness, r = .36, perseverance, r = .71, self-confidence (Pearson product-moment Correlation)

Correlations: r = .99 with rankings following interviews; low correlations with NLSMA Attitude Scales (therefore measuring something different)

Validity: Content validity established by the initial selection of items by 10 judges. Factor analysis indicated the scales factored as expected.

References: Webb, Norman L. et al. Mathematical Problem Solving Project Technical Report IV: Developmental Activities Related to Summative Evaluation (1975-1976). Final Report. Bloomington, Indiana: Mathematics Education Development Center, Indiana University, May 1977. ERIC: ED 168 849.

Mathematical Problem Solving Project Technical Report IV: Summative Evaluation. Appendices A-H. Bloomington, Indiana: Mathematics Education Development Center, Indiana University, May 1977. ERIC: ED 168 850.

Title: "PMDC Mathematics Tests"

Developed by: Project for Mathematical Development of Children staff

Content: elementary counting, advanced counting, addition-subtraction, set equivalence, ordering, class inclusion (grade 1); elementary counting, advanced counting, patterns, place value, equivalent names, ordering, addition-subtraction, missing addend, class inclusion (grade 2)

Format: grade 1, 6 scales; grade 2, 9 scales

Sample: 185 students in grade 1, 152 students in grade 2

Reliability: Grade 1, r = .93 (Cronbach's alpha), r = .95 (Spearman Brown split-half). Grade 2, r = .94 (Cronbach's alpha), r = .93 (Spearman Brown split-half)

Correlations: Grade 1, r = .79 with KeyMath Test; r = .72 with Otis-Lennon Mental Ability Test. Grade 2, r = .82 with KeyMath Test, r = .68 with Otis-Lennon Mental Ability Test.

Validity: assesses objectives of PMDC materials

Reference: Clarke, Cynthia A. *Description and Statistical Results of the 1975 Fall Testing Program*. PMDC Technical Report No. 4. Tallahassee, Florida: Project for the Mathematical Development of Children, Florida State University, 1976. ERIC: ED 144 803.

SUPPLEMENTARY LIST OF INSTRUMENTS

The instruments listed in this section are not included elsewhere in this document. In each instance, little (or no) information about reliability and validity was provided in the abstract or article. That the instrument was investigator-developed was stated or implied, however. Following the list are the complete references for all entries on the list.

Developer	Content/title	Level	Data
Abebe, B. (1974)	class and conditional logic (in Amharic language)	grades 3, 5, 7, 9, 11 (Ethiopia)	----
Abu Zeineh, F. K. (1976)	Comprehensive Test (basic mathematical concepts and skills), Achievement Test (transformation geometry, number systems)	in-service teachers of grades 7-9 (Jordan)	----
Abbott, S. L. (1976)	conditional sentence reasoning	college	----
Agrawal, P. C. (1979)	metric knowledge, attitude	in-service elementary teachers	----
Alexander, J. T. (1977)	metric knowledge and attitudes	secondary teachers	----
Alexander, T. L. (1979)	college algebra	college	internal validity
Allen, F. R. (1977)	probability and statistics	secondary, college	----
Allen, M. B. (1976)	decimals	grade 6	----
Altman, B. J. (1976)	numeration, finite systems	junior college	----
Anderson, B. J. (1978)	abstract denotative concepts	college	----
Anderson, L. W. (1975)	mulciplication, division	grade 3	----

Developer	Content/title	Level	Data
Anderson, M. C. (1979)	Geometric Solids Scales	grades 1-6	reliable, predictive
Anderson, W. C. (1977)	equality	grade 2	----
Andreozzi, P. P. (1975)	algebra	grade 9	r = .62, .77
Ankney, P. H. & Joyce, L. K. (1975)	Paper-and-Pencil Test (Piagetian concrete reasoning)	ages 8-14	face validity
Antonak, R. F. (1976)	Antonak-Roberge Test of Conditional Reasoning	ages 6-18	unreliable for ages 6-9½
Apter, J. R. (1976)	placement test	community college	----
Arehart, J. E. (1979)	probability	grades 9, 10	----
Armstrong, J. S. (1978)	Professional Knowledge and Skills Test	college	----
Armstrong, L. H. (1974)	numeration, attitude toward mathematics	preservice elementary teachers	----
Arougheti, J. L. (1978)	algebra	grades 9, 10	----
Atkinson, D. T. (1976)	algebra	college	----
Attivo, B. J. A. (1979)	estimation of metric length and area	preservice elementary teachers	----
Atweh, W. F. (1979)	cardinal and ordinal number concepts	primary	most correlations with tasks above .25
Austin, H. W. (1975)	calculus	college	----
Austin-Martin, G. G. (1976)	logic	grades 6-8	----
Aveilhe, C. C. (1975)	quantitative comparisons (algebra)	secondary	----
Ayers, S. W. (1977)	Statistics Content Assessment, View of Statistics Inventory	college	two instruments correlated

Developer	Content/title	Level	Data
Azouz, A-A. H. (1978)	attitudes toward mathematics, self, teacher, teaching purposes	intermediate grades (Saudi Arabia)	correlated to each other, .61 to .95 (students), .38 to .77 (teachers)
Baker, B. E. (1977)	place value skills	grade 1	----
Baltz, B. L. (1977)	transformational geometry (congruence)	secondary	----
Bankston, L. V. C. (1975)	remedial mathematics	community college	----
Barber, J. R. (1975)	geometry and astronomy concepts	grade 4	----
Barnes, G. B. (1978)	Piagetian tasks	college	----
Barnett, J. C. (1974)	problem solving	college	----
Barr, D. C. (1976)	Skills Achievement Test (numeration), Applications Test (numeration)	kindergarten	----
Barron, E. D. T. (1979)	problem-solving heuristics	in-service elementary teachers	----
Bartling, J. S. (1979)	Interest in Learning Mathematics	preservice elementary teachers	----
Barton, P. C. (1975)	Piagetian geometric ideas	ages 5, 8	----
Bastek, C. P. (1981)	group theory	grades 10, 11	----
Bauer, J. L. (1975)	decimals, metric transfer	grade 7	----
Baxter, M. M. (1974)	Teacher Appraisal of Mathematical Ability Scale	grade 6	----
Bencsik, G. C. (1977)	percent	college	validated
Benton, B. L. (1979)	Career Aspiration Scales	college	----

Developer	Content/title	Level	Data
Beul, B. T. (1974)	Mathematics Attitude-Interest Test	grade 7	----
Birkhead, V. V. S. (1974)	attitudes toward the teaching of mathematics	preservice elementary teachers	----
Blackwood, E. N. (1975)	probability	preservice elementary teachers	----
Boehmer, D. P. (1978)	Criterion-Referenced Mathematics Placement Test	EMRs	----
Boodt, M. I. (1980)	remedial algebra	college	----
Borden, V. L. (1977)	decimals	grade 6	----
Boulware, G. W. (1976)	Learning Activity Package mathematics competency tests	secondary	average r = .78
Bowie, E. L. (1979)	arithmetic reasoning	grades 1, 2	----
Bowman, D. G. (1976)	Basic Mathematics Diagnostic Instrument	community college	----
Brandner, R. J. (1976)	linear equations	grade 9	----
Brannen, P. P. (1978)	economics applications	secondary teachers	----
Bredie, J. W. B. (1980)	problem solving	grade 6	----
Brevit, J. H. (1976)	quantitative thinking ability	college	----
Brey, R. K. (1980)	problem solving, computation	grade 4	----
Bright, J. E. (1980)	Function Concept Assessment	junior college	----
Brockmann, E. M. (1978)	Serial Search Scanning Process Test (memory skills pertinent to place-value tasks)	grade 2	----
Brooks, H. J. (1975)	metric system	grade 7	validated

Developer	Content/title	Level	Data
Brumfield, R. D. (1977)	linear metric measures	grade 3	----
Brunson, P. W. (1981)	algebra	college	reliability and validity determined
Buckley, E. A. (1977)	quantitative problem-solving ability in physical sciences	community college	----
Burek, M. J. (1975)	fundamental skills, attitude toward mathematics	grades 6-8	----
Bush, H. L. (1976)	Test on Quantitative Concepts	grade 8	----
Bystrom, N. C. (1976)	algebra, trigonometry, coordinate geometry (diagnostic)	college	----
Caldwell, J. H. (1978)	problem solving	grades 4-12	----
Calfee, R. C. & Calfee, K. H. (1976a, b)	Reading and Mathematics Observation System (RAMOS)	teachers in grades 2, 5	----
Campbell, N. J. (1975)	teacher diagnostic inventory on pre-algebra competencies	in-service secondary teachers	----
Canadore College (1976)	Comprehensive Achievement Monitoring Tests	grades 1-12	----
Cannella, G. S. (1979)	Group Piaget Battery	grade 1	----
Caponecchi, W. P. (1974)	matrices	college	r = .84 (KR-14)
Carlen, A. (1977)	attitudes toward type of scheduling	secondary	----
Carpenter, J. E. (1978)	group theory	college	----
Carr, D. V. (1977)	remedial mathematics	community college	----
Carrier, C. A. (1977)	geometry	grade 4	----

Developer	Content/title	Level	Data
Carroll, C. D. (1975)	geometry problems	grade 10	r = .92, .93
Casterlow, G. (1981)	Calculator Instruction Test, Calculator Computation Test	preservice elementary teachers	----
Cathcart, D. C. (1975)	self-concept as a teacher of mathematics, Fundamental Concepts Achievement Test	preservice elementary teachers	----
Chapman, J. B. (1980)	statistics	college	----
Cicchelli, T. (1979)	probability and graphing	grade 5	----
Cleary, M. F. (1977)	algebra	college	----
Clewell, W. D. (1976)	mathematical maturity battery	college	----
Coburn, T. G. (1974)	equivalent fractions	grade 4	----
Cohen, L. J. (1977)	statistics	college	----
Cohen, M. A. (1976)	functional assessment battery	grade 1	----
Cohen, M. P. (1977)	problem solving	grade 8	----
Colgan, L. H. (1977)	basic mathematics	college	correlations with marks, r = .63, .74
Conradi, M. S. (1975)	problem solving	grades 3-7	----
Cooke, C. C. (1980)	Attitudes Toward Arithmetic, Mathematics	grades 6-8	----
Coon, L. A. (1974)	algebra, trigonometry, differentiation, integration	college	----
Coppus, S. A. (1978)	APL Assessment, An Opinion Survey: How Do You Feel About Computers, Programming Style	college	----
Corwin, V. W. V. (1978)	Student and Teacher Laboratory Activity Opinionnaires	grade 10	----

Developer	Content/title	Level	Data
Cox, P. L. (1980)	geometry	grades 10, 11	----
Cross, L. H. (1974)	algebra	grade 11	----
Crouse, R. J. (1977)	probability	preservice elementary teachers	----
Crumpton, S. D. (1978)	Mathematical Competency Test	college	----
Cummins, C. A. (1977)	geometry (locus concept)	grade 10	----
Dann, E. (1976)	Pre-Statistics Concepts Test	two-year college	----
Davis, J. D. (1974)	functions of a real variable	college	----
Davis, L. H. (1976)	problem solving (linear equations)	grade 8	validated
Davis, S. M. (1978)	addition and subtraction of integers	elementary	----
deBronac-Meade, M-L. E. (1981)	Math Skills Test	secondary, college	----
DeCicco, E. K. (1974)	attitudes toward task sessions	grades 7, 8	----
DeVincenzo, M. A. R. (1980)	arithmetic, algebra	grade 9	r = .86 r = .85
Dubriel, J. B. (1978)	algebra	grade 9	r = .74 to .86
Duncan, D. D. (1976)	elementary functions	college	----
Durgin, M. W. (1979)	business applications	college	r = .57 to .69
Dyer, P. W. (1976)	college algebra	community college	r = .92, .88
Edwards, N. T. (1979)	mathematical reasoning skills	ages 6, 8, 10	"acceptable reliability"
Edwards, W. P. (1975)	basic mathematics	preservice elementary teachers	r = .78 (pre), .85 (post)
Egolf, K. L. (1979)	problem solving	grades 7, 8	----

Developer	Content/title	Level	Data
Ekstrom, R. B. (1976)	BTES instruments	teachers and students in grades 2, 5	----
Erker, L. E. (1974)	Observational Checklist of Instructional Variety	preservice secondary teachers	----
Eveland, L. W. (1975)	attitude toward IPI	elementary	----
Farrell, J. R. (1980)	algebra	junior high	----
Faw, P. J. (1978)	geometry	grades 6, 8, 10	----
Fenrow, E. L. (1975)	attitudes toward standardized group tests	teachers in grades 3-6	----
Ferguson, H. L.	computational skills (nursing)	college	r = .72 to .80 (KR)
Fesharaki, M. (1979)	decimals, percent, estimation	grades 7, 8	----
Filby, N. & Dishaw, M. (1976a, b)	BTES instruments	grades 2, 5	wide range
Fishell, F. E. (1975)	division	grade 5	r = .90, .92
Fitzmaurice, A. M. (1976)	attitudes	grades 1-6	----
Flower, T. F. (1978)	metric system	in-service teachers	----
Forsythe, H. O. (1975)	integers	grades 3-5	----
Gage, R. L. (1977)	Concept Attainment Test (algebra)	grade 7	----
Gallery, M. E. (1978)	computational skills, calculator skills	secondary	----
Garbe, D. G. (1974)	basic mathematics terms	grade 8	----
Gates, M. J. (1977)	geometry (plane regions), attitudes toward mathematics and mathematics courses	preservice elementary teachers	----

Developer	Content/title	Level	Data
Gibbs, S. A. O. (1979)	metric system	adults	----
Giffune, M. P. (1979)	problem solving	grade 9	r = .72
Ginther, J. et al. (1976)	fractions	grade 8	----
Gitlin, E. C. (1980)	Teacher Attitude Toward Teaching Mathematics, Teacher Attitude Toward Students	grade 6	----
Glavach, M. J. (1977)	Basic Addition Skills Test	kindergarten to grade 4	----
Goldberg, S. (1980)	problem solving	grade 7	----
Golden, Br. N. (1977)	understanding of deductive structure, attitudes	grade 10	----
Goldman, B. D. (1974)	mathematics problems (chemistry)	grade 11	----
Goodman, T. A. (1977)	geometry	grades 9, 10	----
Graham, V. G. (1978)	problem solving	grades 5, 6	----
Gramick, J. (1976)	subtraction	intermediate grades	----
Grant, O. K. (1979)	polynomial functions	college	validated, checked for reliability
Gullen, G. E. (1978)	Set Comparison Test, Quantification Test	kindergarten to grade 2	----
Guthrie, E. R. (1978)	disjunctive concept	college	----
Hagan, A. M. (1977)	geometry	grade 10	----
Hall, W. D. (1977)	estimation, problem solving	grade 5	r = .74 r = .82 (KR-21)
Hamrick, A. K. B. (1977)	addition, subtraction	grade 1	----

Developer	Content/title	Level	Data
Hamzeh, G. S. (1978)	achievement	preservice elementary teachers	----
Hansen, J. R. (1974)	arithmetic concepts	in-service teachers (grades 1-9)	----
Hansen, V. T. (1976)	mathematical ability	college	----
Harbor-Ibeaja, V. F. N. (1979)	arithmetic, fractions	grades 6, 8	----
Hartje, H. C. (1975)	Achievement Test, Retention Test (group theory)	grade 12, college	----
Harutunian, H. (1974)	addition with fractions	grade 5	----
Harvey, R. A. (1974)	achievement	preservice elementary teachers	----
Hayatgheib, K. (1978)	Tendency to Teach Mathematics Inductively	preservice teachers	----
Hazekamp, D. W. (1977)	multiplication	grade 4	----
Headrick, M. L. (1976)	attitudes toward metri-metrication, metric knowledge	in-service secondary teachers	r = .99 r = .62
Heatherly, F. D. (1978)	Metric Achievement Inventory for Teachers	in-service teachers	----
Heffernan, J. T. (1979)	understanding introductory college statistics, course attitude	college	validity and reliability indices
Herring, C. R. (1976)	achievement, Attitude Instrument	college	----
Herrington, J. P. (1980)	problem solving	grade 7	----
Herrmann, J. F. (1976)	multiple-line graphs	grade 5	----
Hervey, R. H. (1980)	metric system	grades 6-8	----
Hesemann, J. P. (1976)	algebra word problems	grade 9	----

Developer	Content/title	Level	Data
Heyn, J. E. (1980)	problem solving	ages 20-70	----
Hildebrandt, M. E. (1977)	parental attitudes about mathematics education	grade 7 parents	----
Hill, T. A. (1977)	division	grades 5, 7, 9	r = .95 (KR-21)
Hirsch, L. R. (1979)	sigma notation	college	----
Hoehn, L. P. (1974)	concept of "dependent"	grade 8	----
Hohlfeld, J. F. (1974)	multiplication facts	grade 5	----
Hollis, J. H. (1975)	inventory of cognitive style	grades 4-6	----
Horvath, M. J. (1976)	mathematics attitudes	grades 7-9	----
Houtz, J. C. (1974)	problem solving	grades 2, 4	----
Howlett, K. D. (1974)	missing addend computation, problems	grade 1	----
Huber, J. C. (1977)	trigonometry	secondary	----
Hunt, H. C. (1976)	algebraic fractions	college	----
Hunt, M. L. (1979)	problem solving	college	----
Ireland, S. C. (1980)	addition and subtraction problems	grade 3	----
Ireland, S. H. (1974)	geometric proof	grade 10	----
Irons, C. J. (1975)	division problems	grade 2	----
Jackson, H. E. (1979)	Comprehension Final Examination (calculus)	college	----
Jackson, R. E. (1974)	Jackson Mathematics Attitude Scale	college	----
James, M. A. (1974)	set concepts	grade 6	----
Jamski, W. D. (1977)	rational numbers, percent	grade 7	validated by teacher
Janovsky, A. V. (1976)	predicting distances	grades 7, 9, 11	----

Developer	Content/title	Level	Data
Johnson, W. G. (1974)	general mathematics, attitude	grade 9	r = .81 r = .82
Jones, G. A. (1975)	probability	grades 1-3	----
Kaufman, D. M. (1974)	calculus	preservice elementary teachers	----
Keating, R. T. (1978)	Omnibus Placement Test	community college	content validity obtained
Keils, W. H. (1977)	General Drawing Test (geometry)	grade 10	correlated with DAT sub-scale scores, .19 to .29
Keller, C. M. (1974)	attitude, achievement	grade 9	----
Kerns, C. M. (1977)	Purpose Poll (why taking algebra), Student Opinion Poll (uses of applications)	college	----
Kersten, T. L. (1976)	matrices	college	r = .87 (KR-20)
Kimes, B. A. (1974)	Tennessee Self-Concept Scale	college	----
King, C. C. (1976)	probability knowledge, attitude toward probability	preservice elementary teachers	----
King, D. V. (1975)	plane geometry	grade 10	----
King, V. C. R. (1976)	achievement	grade 4	----
Kleinhaus, Sr. R. (1977)	achievement	preservice elementary teachers	----
Klingbeil, D. H. (1975)	achievement	college	----
Klinger, W. R. (1974)	remedial basic algebra	college	content validity: r above .78 (KR-20)
Knippenberg, G. P. (1979)	attitudes	preservice elementary teachers	----

Developer	Content/title	Level	Data
Knoll, M. K. (1977)	Knoll Environment Observation Scale	grade 3	validated
Knott, J. R. (1974)	geometry, algebra, calculus	grades 10-12	----
Kolpas, S. J. (1979)	computation	grade 9	----
Korb, R. A. (1974)	Thinking Interest Survey (cognitive style)	college	----
Kossack, S. W. (1977)	Informal Reading Inventory	grades 3-5	----
Kovaly, M. J. (1980)	Algebra I Predictive Test	grade 9	----
LaMay, L. J. (1976)	linear measurement	grade 4	validated
Lamb, R. L. (1977)	Graph Theory Achievement	secondary	----
Lambert, N. M. & Hartsough, C. S. (1976); Lambert, N. M. (1976)	Anecdotal Processing to Promote Learning Experience (APPLE) Observation System	teachers in grades 2, 5	----
Lang, M. T. (1974)	Calculus-Concepts Test	college	----
Lazerick, B. E. (1976)	computation	grade 4	----
Leach, M. L. M. (1974)	algorithms	preservice elementary teachers	----
Lemasters, C. R. (1979)	graphical calculus	community	r = .85 (KR-20)
Lettieri, F. M. (1980)	concept of number	grades 1, 2	----
Leutzinger, L. P. (1980)	addition	grade 1	----
Levine, D. R. (1981)	Test of Estimation Ability	college	----
Liguori, R. A. (1974)	business mathematics	college	----
Lockhart, M. (1977)	metric system	in-service elementary teachers	----

Developer	Content/title	Level	Data
Lockwood, R. E. (1978)	geometry	grade 5	----
London, E. (1978)	achievement	grade 8	----
Loomer, N. J. (1976)	Measure of Teacher Fidelity to the Model	college	----
Mages, G. (1976)	probability, statistics	preservice elementary teachers	----
Malo, G. E. (1975)	disjunctive concepts	college	----
Mamary, A. (1976)	achievement	grades 6, 9	----
Manet, C. M. (1978)	concepts	ages 3, 5	----
Mao, L. (1976)	Test of Mental Abacus Computation Abilities	preservice elementary teachers	reliabilities computed
Marburger, W. F. (1976)	metric system	grade 7	----
Marchand, S. G. (1974)	attitudes, achievement	college	r = .82
Marchegiani, B. V. (1978)	Comprehensive Final Examination (calculus)	college	----
Marcus, S. T. (1974)	mathematics for chemistry	college	----
Martin, J. L. (1975)	topology	ages 4, 6, 9	----
Martin, M. E. J. F. (1978)	diagnostic test on classification	grades 6-8	r = .9
Mason, G. E. (1978)	achievement	community college	validity and reliability computed
Masse, M. A. (1979)	computation skills	grades 2, 3	----
Matlow, R. H. (1977)	Place Value Concept	elementary	----
Matty, E. J. (1978)	algebra	grade 9	----
Mayer, M. L. (1975)	computation, problem solving	ages 13-19 (EMRs)	----

Developer	Content/title	Level	Data
McBride, C. C. (1974)	college algebra	college	----
McCarthy, K. A. (1976)	mathematical aptitude	grades 10-12	----
McClintock, C. E. (1975)	algebra	grade 10	----
McClung, C. J. (1977)	equivalent fractions	grade 6	----
McClung, K. A. (1977)	equivalent fractions	grade 6	----
McCuiston, R. S. (1975)	Mathematics Alternate Uses Test, Multiple Methods Test, Report of Successful/ Unsuccessful Lessons	teachers in grades 4-6	----
McKee, M. R. (1976)	Parent Expectation Instrument	grades 8, 9	----
McMaster, M. J. (1976)	multiplication, division	grades 4-6	----
Melillo, M. M. (1981)	elementary school objectives	grades 3-6	----
Meyer, R. A. (1976)	computation, problem solving	grade 4	----
Miles, M. M. (1980)	attitudes	grade 8	----
Miller, B. M. (1978)	Teacher Rating Instrument	secondary	----
Miller, M. S. M. (1975)	map skills	grades 7, 8	----
Miller, W. L. (1975)	achievement	community college	----
Mitchelmore, M. C. (1974, 1975)	Solid Representation Test	grades 1, 3, 5, 7, 9	r = .95 (Cronbach alpha)
Moers, D. R. (1979)	addition, multiplication	college	predictive validity studied
Moffett, N. W. (1978)	distance conservation, spatial coordinate system	ages 6-12	----
Molina, A. L. (1977)	technical algebra	college	----

Developer	Content/title	Level	Data
Molina, N. M. (1977)	use of games	preservice elementary teachers	checked for validity
Monier, M. I. (1977)	geometry	grades 9, 10 (Afghanistan)	----
Montano Midence, R. F. (1974)	permutations	college	----
Moore, W. K. (1976)	calculus, attitudes	college	----
Moorman, E. L. (1975)	Algebra Survey	grade 5	----
Morris, J. P. (1975)	geometry	grade 2	----
Moses, B. E. (1978)	Problem Solving Inventory	grade 5	----
Mowder, B. H. (1977)	sex-biased tests	grades 3, 6	----
Muangnapoe, C. (1975)	fractions	grades 3, 4	----
Mueller, D. J. (1975)	logic (geometry)	grade 10	----
Mullen, G. S. (1979)	metric system	in-service elementary teachers	validity and reliability computed
Murphy, E. B. (1981)	mathematical terms	grades 4,7	----
Murray, D. E. (1974)	Murray Test of Conservation	grade 1	----
Neal, L. M. D. (1975)	algebra placement	college	----
Nicholson, J. L. (1976)	vectors	grade 6	----
Niver, M. B. (1977)	volume	preservice elementary teachers	----
Novillis, C. F. (1974)	Fraction Concept Test	grades 4-6	----
Ohrenberg, R. J. (1977)	metric system	grade 6	validity and reliability established
Oldaker, L. M. (1976)	use, knowledge of diagnostic/prescriptive concepts and procedures	in-service elementary teachers	----

Developer	Content/title	Level	Data
Olshen, J. S. (1976)	mental arithmetic	grades 1-6	----
Olson, F. M. (1977)	Statistics Achievement Test	college	----
Owens, B. B. (1978)	computer programming	college	----
Pachter, S. N. (1979)	second-degree polynomials	grade 9	----
Packer, C. M. (1979)	Mathematics Achievement Test	college	validated
Padula, R. M. (1975)	program evaluation	elementary	reliability established
Paige, J. P. (1974)	calculus	college	----
Pasquino, A. D. (1978)	modeling	grade 7	correlated .63 with Raven's Matrices
Paul, C. A. (1979)	Piagetian formal operations	college	validity determined
Payne, C. I. (1980)	achievement	grades 11, 12	----
Perkins, R. D. (1978)	mathematics skills in chemistry	college	----
Philips, C. A. (1974)	achievement	grades 5, 6	----
Pigford, V. D. (1975)	metric system	preservice elementary teachers	----
Pinchback, C. L. (1978)	probability	grade 5	----
Pitiyanuwat, S. (1977)	Mathematics Attitude and Intention Inventory	grade 7	----
Pluta, R. F. (1980)	formal reasoning	college	validated
Power, G. M. (1981)	Metric Content Acquisition Test	grades 3, 5	----
Powers, S. K. (1976)	cognitive questions	in-service elementary teachers	----
Prekeges, D. P. (1974)	understanding, attitude toward contemporary mathematics	teachers in grades 4-6	----

Developer	Content/title	Level	Data
Preston, D. K. (1975)	arithmetic and geometric progressions	grades 9, 10	----
Price, J. R. (1975)	line graphs	college	----
Pridmore, B. M. (1979)	operations, equations, trigonometry, logarithms, problems	junior college	----
Prielipp, R. W. (1976)	achievement	grades 7-9	----
Prigge, G. R. (1974)	geometry	grade 3	----
Punn, A. K. (1974)	Multiplication Usage Test	grade 3	----
Ramey, C. V. (1974)	fractions, scientific notation, unit conversions (diagnostic)	college	----
Rees, J. M. (1975)	linear metric measures, attitudes	grade 4	----
Reinauer, C. D. (1981)	algebra	college	----
Renner, J. W. et al. (1978)	displacement volume	grades 7-12	----
Richardson, L. I. (1974)	perceptions of problem solving instruction	teachers, grades 9, 10	----
Richbart, L. A. (1978)	Topic Survey Test	grades 9-11	----
Richmond, G. (1979)	radicals	grade 9	reliability computed
Riggs, F. T. & Nelson, L. C. (1976)	geometry, numeration, addition, subtraction	grade 1	r = .79
Riley, J. D. (1977)	problem solving	grade 7	----
Robinson, E. B. (1978)	decimals	grades 3, 4	----
Romberg, T. A. (1975)	addition, subtraction	grades 2, 3, 5	----
Rose, J. S. (1979)	Teacher Locus of Control Scale	teachers in grade 4	----

Developer	Content/title	Level	Data
Rose, R. R. (1977)	dependency on visual feedback	grade 10	----
Rovet, J. F. (1977)	spatial skills	grade 3	----
Sachs, L. A. (1979)	prime numbers	grade 5	----
Sadler, W. L. (1977)	modeling theory	college	----
Sadowski, B. R. (1981)	fractions	grades 7, 8	----
Sanjivamurthy, P. T. (1978)	college algebra	college	----
Scalzo, F. (1976)	Observation Rating Scale for Psychomotor and Conceptual Learning Difficulties	college	validated
Schmeling, D. M. (1976)	selected mathematical skills	secondary?	----
Schmidt, G. E. (1974)	attitudes	college	tested for reliability and validity
Schroeder, M. H. (1979)	spatial and mathematical reasoning ability, formal thought ability	college	validity and reliability established
Schwartz, R. C. (1978)	attitudes, metric system	preservice elementary teachers	----
Scott, D. L. & Webb, L. F. (1979)	algebra, geometry	grades 9-11	----
Scott, J. W. (1977)	attitudes toward and knowledge of metric system	in-service teachers	----
Scott, J. E. (1979)	statistics	community college	----
Sepie, A. C. & Keeling, B. (1978)	mathematics anxiety	ages 11, 12	r = .90
Shafer, J. M. (1976)	topology, limit and continuity	college	r = .93, .94, .89
Shapiro, S. J. (1978)	Allied Health Math Test	community college	----

Developer	Content/title	Level	Data
Sharpton, R. E. (1977)	attitudes, achievement	grades 9-12	----
Simpson, C. J. (1974)	achievement	grade 7	----
Sklar, R. I. (1977)	algebraic coding theory	college	----
Smead, V. S. (1977)	Experimenter Compiled Mathematics Test	grade 8	----
Smith, C. A. (1979)	division of fractions	elementary	----
Smith, C. D. (1976)	retention	college	r = .73 (KR-20)
Smith, G. J. (1974)	Number Concept Test	grade 1	predictive correlations, .49 to .86
Smith, G. C. (1975)	Overt Classroom Behavior Inventory	grade 9	correlations with attitude scale
Smith, J. E. (1974)	area	grade 7	----
Smith, J. (1974)	probability and statistics	college	----
Smith, J. E. (1979)	fractions (carpentry)	grades 11, 12	----
Smith, M. L. A. (1976)	achievement	college	r = .83, .94
Smith, R. L. (1978)	problem solving	post-secondary	reliability tested
Smith, R. M. (1976)	Mathematics Attitude Semantic Differential	college	validity and reliability established
Smith, S. R. (1979)	linear metric measures, length conservation	grades 1, 2	----
Snyder, D. W. (1974)	achievement	preservice elementary teachers	----
Snyder, W. H. (1977)	Einstellung effects	junior college	----
Sorensen, D. E. (1979)	number theory	college	r = .78, .74, .57
Southall, J. C. (1979)	problem solving	grades 3, 4	----

Developer	Content/title	Level	Data
Souviney, R. J. (1977)	cognitive operations, computational skills	kindergarten, grades 1, 3	----
Spencer, E. R. (1976)	algebra	secondary	reliability determined
Stannard, K. I. M. (1977)	Cognitive Development Survey	grades 1-6	----
Steger, C. D. (1977)	place value	grade 1	----
Steinback, M. (1980)	functions, graphs, function equations	community college	----
Stewart, W. J. (1975)	calculus	college	----
St. Martin, A. H. (1975)	achievement	grade 5	validity and reliability determined
Stockdale, L. N. (1980)	multiplication	grade 9	----
Stone, D. B. (1974)	placement inventory	college	----
Stotts, R. L. (1977)	linear metric measures	technical college	validity and reliability determined
Stratigos, H. D. (1976)	opinions on assistants' performance	grades 10-12	----
Strawn, D. L. (1975)	calculus	college	----
Strong, R. L. (1975)	trigonometry	grade 12	----
Summerfield, J. O. (1975)	factors and primes	grades 5, 6	----
Sutherlin, W. N. (1977)	mental estimation skills	grades 5, 6	----
Taylor, C. O. (1978)	metric system	grade 8	----
Taylor, C. L. (1974)	Problem Solving Test	grade 11	validity and reliability determined
Thompson, F. A. M. (1974)	geometric properties	ages 4-6	----
Thompson, L. G. (1976)	algebra	grade 9	----

Developer	Content/title	Level	Data
Tokar, E. B. (1974)	achievement	grade 5	----
Topping, C. S. (1976)	sex-role preference, peer reputation	grades 2, 4, 6	----
Townsend, G. C. (1979)	probability estimation achievement, attitudes	grade 11	----
Tsang, S. (1976)	computation, problem solving (Chinese, Spanish)	grades 7, 8	----
Turkel, S. B. (1977)	verbal interaction patterns	elementary	----
Vandenberg, G. J. (1979)	propositional logic	ages 13-23	----
Van Wie, J. L. (1977)	Achievement in Problem Solving Instrument	college	----
Verderber, N. L. (1975)	reading comprehension	college	----
Vernon, C. H. (1979)	mathematical concepts	?	----
Visor, A. L. (1976)	arithmetic diagnostic test, attitudes	community college	----
Wagner, H. A. (1976)	fractions	grades 2-5	----
Walton, H. J. (1979)	Mathematics Placement Test, Mathematics Posttest	college	----
Warner, B. G. (1979)	manipulative place value	grade 2	----
Washinger, K. C. (1974)	calculus placement	college	----
Watson, J. O. (1977)	limits and continuity, Test on Algebra Skills and Functions	grade 12, college	----
Webb, N. L. (1977); MPSP (1977)	problem solving	grades 4-6	----
Weber, C. P. (1978)	barriers to metric change	teachers in grades k-5	----
Wenzelburger, E. (1975)	modulus transfer	grade 7	----

Developer	Content/title	Level	Data
Wescott, J. W. (1977)	attitudes toward metric implementation	in-service teachers	----
Wesney, J. C. (1978)	M-R Pretest (mathematical reasoning for physics)	college	----
Whitaker, D. R. (1977)	problem-solving attitudes of student, teacher	grade 4	----
Whitaker, W. H. (1977)	Computational Arithmetic Problems Test	grade 1	----
White, C. W. (1974)	probability	grades 7, 8	----
Whitlock, P. E. (1974)	problem solving	grades 2, 3	----
Wickless, B. J. (1974)	Wickless Test of Spatial Perception	grades 8-10	----
Wiebe, J. H. (1977)	Place Value Knowledge Survey	grade 2	----
Wilburn, K. T. (1977)	achievement, attitude	grades 6, 7	----
Wilkins, P. W. (1975)	Semantic Differential (attitude), achievement	grade 8	----
Willans, A. E. (1977)	metric system	grades 5, 6	----
Young, C. A. (1975)	Young Exclusion Scale (teacher social and professional interactions)	in-service secondary teachers	----
Zakkour, I. D. (1977)	matrices	college	$r = .72$ (KR-14)
Zeitz, F. F. (1976)	How I See Myself in Math	intermediate grades	----
Zimmerman, C. W. (1979)	problem solving	grade 6	----

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